SERVICE MANUAL

Model:

PDP4210EA

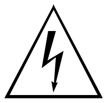
Safety Precaution
Technical Specifications
Block Diagram
Circuit Diagram
Basic Operations & Circuit Description
Main IC Specifications
Product Specification of PDP Module
Trouble Shooting Manual of PDP Module
Spare Part List
Exploded View
If you forget your V-Chip Password
Software Upgrade

This manual is the latest at the time of printing, and does not include the modification which may be made after the printing, by the constant improvement of product.

Safety Precaution



CAUTION: TO REDUCE THE RISK OF ELECTRIC SHOCK, DO NOT REMOVE COVER (OR BACK). NO USER-SERVICEABLE PARTS INSIDE. REFER SERVICING TO QUALIFIED SERVICE PERSONNEL ONLY.



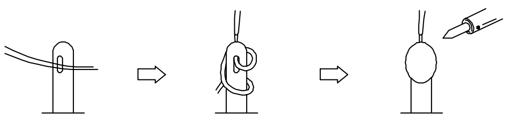
The lightning flash with arrowhead symbol, within an equilateral triangle, is intended to alert the user to the presence of uninsulated "dangerous voltage" within the product's enclo sure that may be of sufficient magnitude to constitute a risk of electric shock to persons.



The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the appliance.

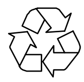
PRECAUTIONS DURING SERVICING

1. In addition to safety, other parts and assemblies are specified for conformance with such regulations as those applying to spurious radiation. These must also be replaced only with specified replacements.
   Examples: RF converters, tuner units, antenna selection switches, RF cables, noise-blocking capacitors, noise-blocking filters, etc.
2. Use specified internal Wiring. Note especially:
   1) Wires covered with PVC tubing
   2) Double insulated wires
   3) High voltage leads
3. Use specified insulating materials for hazardous live parts. Note especially:
   1) Insulating Tape
   2) PVC tubing
   3) Spacers (insulating barriers)
   4) Insulating sheets for transistors
   5) Plastic screws for fixing micro switches
4. When replacing AC primary side components (transformers, power cords, noise blocking capacitors, etc.), wrap ends of wires securely about the terminals before soldering.



5. Make sure that wires do not contact heat generating parts (heat sinks, oxide metal film resistors, fusible resistors, etc.)
6. Check if replaced wires do not contact sharply edged or pointed parts.
7. Make sure that foreign objects (screws, solder droplets, etc.) do not remain inside the set.

MAKE YOUR CONTRIBUTION TO PROTECT THE ENVIRONMENT

Used batteries with the ISO symbol  for recycling as well as small accumulators (rechargeable batteries), mini-batteries (cells) and starter batteries should not be thrown into the garbage can.

Please leave them at an appropriate depot.

WARNING:

Before servicing this TV receiver, read the SAFETY INSTRUCTION and PRODUCT SAFETY NOTICE.

SAFETY INSTRUCTION

The service should not be attempted by anyone unfamiliar with the necessary instructions on this apparatus. The following are the necessary instructions to be observed before servicing.

1. An isolation transformer should be connected in the power line between the receiver and the AC line when a service is performed on the primary of the converter transformer of the set.
2. Comply with all caution and safety related provided on the back of the cabinet, inside the cabinet, on the chassis or picture tube.
3. To avoid a shock hazard, always discharge the picture tube's anode to the chassis ground before removing the anode cap.
4. Completely discharge the high potential voltage of the picture tube before handling. The picture tube is a vacuum and if broken, the glass will explode.

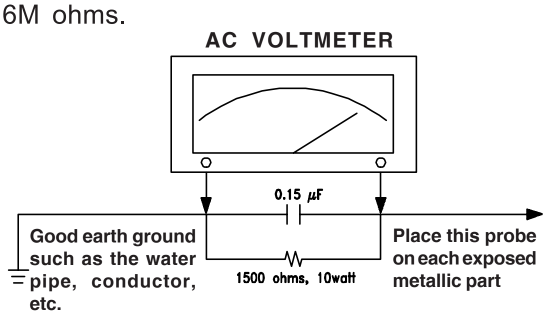
5. When replacing a MAIN PCB in the cabinet, always be certain that all protective are installed properly such as control knobs, adjustment covers or shields, barriers, isolation resistor networks etc.
6. When servicing is required, observe the original lead dressing. Extra precaution should be given to assure correct lead dressing in the high voltage area.
7. Keep wires away from high voltage or high tempera ture components.
8. Before returning the set to the customer, always perform an AC leakage current check on the exposed metallic parts of the cabinet, such as antennas, terminals, screwheads,metal overlay, control shafts, etc., to be sure the set is safe to operate without danger of electrical shock. Plug the AC line cord directly to the AC outlet (do not use a line isolation transformer during this check). Use an AC voltmeter having 5K ohms volt sensitivity or more in the following manner.

   Connect a 1.5K ohm 10 watt resistor paralleled by a 0.15μF AC type capacitor, between a good earth ground (water pipe, conductor etc.,) and the exposed metallic parts, one at a time. Measure the AC voltage across the combination of the 1.5K ohm resistor and 0.15 uF capacitor. Reverse the AC plug at the AC outlet and repeat the AC voltage measurements for each exposed metallic part.

   The measured voltage must not exceed 0.3V RMS.

   This corresponds to 0.5mA AC. Any value exceeding this limit constitutes a potential shock hazard and must be corrected immediately.

   The resistance measurement should be done between accessible exposed metal parts and power cord plug prongs with the power switch "ON". The resistance should be more than 6M ohms.



AC Leakage Current Check

PRODUCT SAFETY NOTICE

Many electrical and mechanical parts in this apparatus have special safety-related characteristics.

These characteristics are offer passed unnoticed by visual spection and the protection afforded by them cannot necessarily be obtained by using replacement components rates for a higher voltage, wattage, etc.

The replacement parts which have these special safety characteristics are identified by ⚠ marks on the schematic diagram and on the parts list.

Before replacing any of these components, read the parts list in this manual carefully. The use of substitute replacement parts which do not have the same safety characteristics as specified in the parts list may create shock, fire, or other hazards.

9. Must be sure that the ground wire of the AC inlet is connected with the ground of the apparatus properly.

Technical Specifications	**MODEL :** ***PDP4210EA*** **42" Plasma Display**			
DATE FIRST ISSUED	**ISSUE** **1**	**RAISED BY**	**CHECKED BY**	**NUMBER OF PAGES** **10**

REVISIONS

ISSUED	DATE	DESCRIPTION	RAISED BY :

SPECIFICATION AGREED :	SIGNATURE	DATE
R & D DEPARTMENT	....	....
COMMERCIAL DEPARTMENT	....	....
PRODUCTION DEPARTMENT	....	....
Q/A DEPARTMENT	....	....
CUSTOMER	....	....

SPECIFICATION APPROVED :	SIGNATURE :	DATE :
.		

NOTE :	Only documents stamped "Controlled Document" to be used for manufacture of production parts.

1. Standard Test Conditions

All tests shall be performed under the following conditions, unless otherwise specified.

1.1 Ambient light : 150ux (When measuring I_B, the ambient luminance ≦0.1Cd/m^2)

1.2 Viewing distance : 50cm in front of PDP

1.3 Warm up time : 30 minutes

1.4 PDP Panel facing : no restricted

1.5 Measuring Equipment : PC, Chroma 2225 signal generator (with Chroma digital additional card) or equivalent, Minolta CA100 photometer

1.6 Magnetic field : no restricted

1.7 Control settings : Brightness, Contrast, Tint, Color set at Center(50)

1.8 Power input : 110~120Vac,60Hz

1.9 Ambient temperature : 20°C ± 5°C (68°F ± 9°F)

1.10 Display mode : 31.5KHz/60Hz (Resolution 852 x 480)

1.11 Other conditions :

1.11.1 With image sticking protection of PDP module, the luminance will descend by time on a same still screen and rapidly go down in 5 minutes. When measuring the color tracking and luminance of a same still screen, be sure to accomplish the measurement in one minute to ensure its accuracy.

1.11.2 Due to the structure of PDP, the extra-high-bright same screen should not hold over 5 minutes for fear of branding on the panel.

ELECTRICAL CHARACTERISTICS

2. Power Input

2.1	Voltage	:	110 ~120VAC
2.2	Input Current	:	3.5A
2.3	Maximum Inrush Current	:	<30 A (FOR AC110V ONLY)
	Test condition	:	Measured when switched off for at least 20 mins
2.4	Frequency	:	60Hz(±3Hz)
2.5	Power Consumption	:	≤ 330W
	Test condition	:	full white display with maximum brightness and contrast
2.6	Power Factor	:	Meets IEC1000-3-2
2.7	Withstanding voltage	:	1.5kVac or 2.2kVdc for 1 sec

3. Display

3.1	Screen Size	:	42” Plasma display
3.2	Aspect Ratio	:	16:9
3.3	Pixel Resolution	:	852x480
3.4	Peak Brightness	:	1000 cd/m² (Panel module without filter)
3.5	Contrast Ratio (Dark room)	:	3000:1 (Panel module without filter)
3.6	Viewing Angle	:	Over 160°
3.7	OSD language	:	English,Spaish,French

4. Signal

4.1 AV & Graphic input

4.1.1 TV standard	:	NTSC/ATSC
4.1.2 TV Tuning system	:	181CH (for NTSC), 2~69CH (for ATSC)
4.1.3 CATV	:	125CH (for NTSC)
4.1.4 Composite signal	:	AV
4.1.5 Y,C Signal	:	S-Video
4.1.6 Component signal	:	Y, Pb/Cb, Pr/Cr, HDTV compatible
4.1.7 Graphic I/P	:	Analog: D-sub 15pin detachable cable Digital: DVI
4.1.8 PnP compatibility	:	DDC 1.0
4.1.9 I/P frequency	:	f_H: 31.5kHz to 60kHz/f_V: 56.25Hz to 75Hz (640x480 recommended)

4.2 Audio input

Audio I/P(L/Rx5) : 1 for DVI
1 for D-Sub
2 for YPbPr
1 for S-Video /AV

4.3 Audio output

Audio O/P(L/Rx1) : Monitor out(L/R)

SPDIF : Optical x 1

5. Environment

5.1 Operating environment

5.1.1 Temperature : 5º to 33°C

5.1.2 Relative humidity: 20% to 85%(non-condensing)

5.2 Storage and Transport

5.2.1 Temperature : -20°C to 60°C(-4º to 140°F)

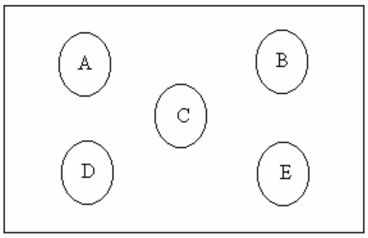
5.2.2 Relative humidity: 5% to 95%

6. Panel Characteristics

6.1	Type	:	LG V6
6.2	Size	:	42”, 1005mm(width)x597mm(height)x61mm(depth)±1 mm)
6.3	Aspect ratio	:	16:9
6.4	Viewing angle	:	Over 160°
6.5	Resolution	:	852x480
6.6	Weight	:	14.8kg ±0.5 kg (Net)
6.7	Color	:	16.77 million colors by combination of 8 bits R,G,B digital
6.8	Contrast	:	Average 60:1 (In a bright room with 150Lux at center) Typical 3000:1 (In a dark room 1/25 White Window pattern at center).
6.9	Peak brightness	:	Typical 1000cd/㎡ (1/25 White Window)

6.10 Color Coordinate Uniformity : Contrast; Brightness and Color control at normal setting

: Full white pattern



Average of point A,B,C,D and E +/- 0.01

6.11 Color temperature : Contrast at center (50); Brightness center (50);
Color temperature set at Natural
x=0.285±0.02
y=0.293±0.02

6.12 Cell Defect Specifications
Subject to Panel supplier specification as appends.

7. Front Panel Control Button

7.1 CH Up / Down Button : Push the key to changing the channel up or down. When selecting the item on OSD menu.

Volume Up/ Down Button : Push the key to increase the volume up or down. When selecting the adjusting item on OSD menu increase or decrease the data-bar.

Menu Button : Enter to the OSD menu.

Input Select Button : Push the key to select the input signals source.

7.2 Stand by Button : Switch on main power, or switch off to enter power Saving modes.

7.3 Main Power Switch : Turn on or off the unit.

8. OSD Function

Full on screen display

9. Agency Approvals

Safety UL60950

Emissions FCC class B

10. Reliability

11.1 MTBF : 20,000 hours(Use moving picture signal at 25°C ambient)

11. Accessories : User manual x1, Remote control x1, Stand x1, Power cord x1, Battery x 2.

13. Support the Signal Mode

A. VGA and DVI mode

NO.	Resolution	Horizontal Frequency (KHz)	Vertical Frequency (Hz)	Dot Clock Frequency (MHz)
1	640 x 400	31.47	70.08	25.17
2	640 x 480	31.50	60.00	25.18
3	640 x 480	37.50	75.00	31.50
4	640 x 480	37.86	72.81	31.50
5	720 x 400	31.47	70.08	28.32
6	800 x 600	35.16	56.25	36.00
7	800 x 600	37.90	60.32	40.00
8	800 x 600	46.90	75.00	49.50
9	800 x 600	48.08	72.19	50.00
10	832 x 624	49.00	75.00	57.27
11	1024 x 768	48.40	60.00	65.00
12	1024 x 768	56.50	70.00	75.00
13	1024 x 768	60.00	75.00	78.75
14	1152 x 864	63.86	70.02	94.51
15	1152 x 864	67.52	75.02	108.03
16	1280 x 720	45.00	60.00	74.25
17	1280 x 960	60.02	60.02	108.04
18	1280 x 1024	64.00	60.01	108.00

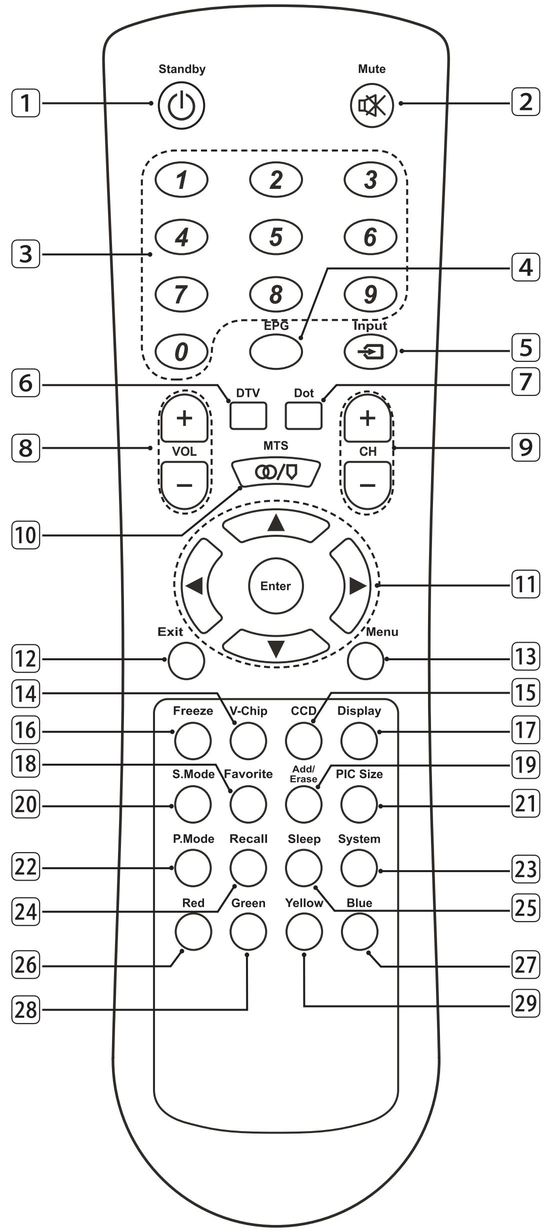
B. HDTV Mode (YPbPr)

NO.	Resolution	Horizontal Frequency (KHz)	Vertical Frequency (Hz)	Dot Clock Frequency (MHz)
1	480i	15.734	59.94	13.50
2	480p(720x480)	31.468	59.94	27.00
3	576p(720x576)	31.25	50.00	27.00
4	720p(1280x720)	37.50	50.00	74.25
5	720p(1280x720)	45.00	60.00	74.25
6	1080i(1920x1080)	33.75	60.00	74.25

- When the signal received by the Display exceeds the allowed range, a warning message "Main Not Support!" shall appear on the screen.
- You can confirm the input signal format from the on-screen.
- DVI could not support some PC Graphic cards.

Remote Control

1 **Standby (⏻)**: Press to turn on and off.
2 **Mute (🔇)**: Press to mute the sound. Press again to restore the sound.
3 **0~9 Number Buttons**: Press 0~9 to select a channel, and used to input the password; the channel changes after 2 seconds.
4 **EPG**: Press to display EPG mode. Press it again to exit EPG mode.
5 **Input**: Press to select the signal source, such as TV, AV, S-Video, Component 1, Component 2, VGA, DVI or DTV.
6 **DTV**: Press to choose DTV directly.
7 **Dot:** Press number buttons with it to select the channels directly in DTV.
8 **VOL +/-**: Press to adjust the volume.
9 **CH +/-** : Press to select the channel forward or backward.
10 **MTS**: Press repeatedly to cycle through the Multi-channel TV sound (MTS) options: Mono, Stereo and SAP (Second Audio Program).
11 ◄,►,▲,▼, **Enter**: Press ◄,►,▲, ▼ to move the on-screen cursor. To select an item, press **Enter** to confirm. And it can also press ▲ or ▼ to select channels, press ◄ or ► to adjust the volume.
12 **Exit**: Press this button to exit.
13 **Menu**: Press to enter into the on-screen setup menu, press again to exit.
14 **V-Chip**: Press to select the child protect mode.



15 **CCD**: Press to select the Closed Caption mode.
16 **Freeze**: Press to freeze the picture, press again to restore the picture.
17 **Display**: Press to display the channel information and it disappear after 3 seconds.
18 **Favorite**: Press repeatedly to cycle through the favorite channel list.
19 **Add/Erase**: Press to add or delete favorite or dislike channels.
20 **S.Mode**: Press repeatedly to cycle through the sound mode: Normal, News, Cinema, Flat and User.
21 **PIC Size**: Press repeatedly to cycle through the picture size that best corresponds your viewing requirements: Normal, Full, Wide1, Wide2, Wide3, 4:3, No Scale and Panoramic.

(Continued on next page)

22 **P.Mode**: Press repeatedly to cycle through the picture mode: Normal, Vivid, Hi-Bright, User and Dark.

23 **System**: Press repeatedly to cycle through the system options: AUTO, and NTSC3.58.

24 **Recall**: Press to return to previous channel.

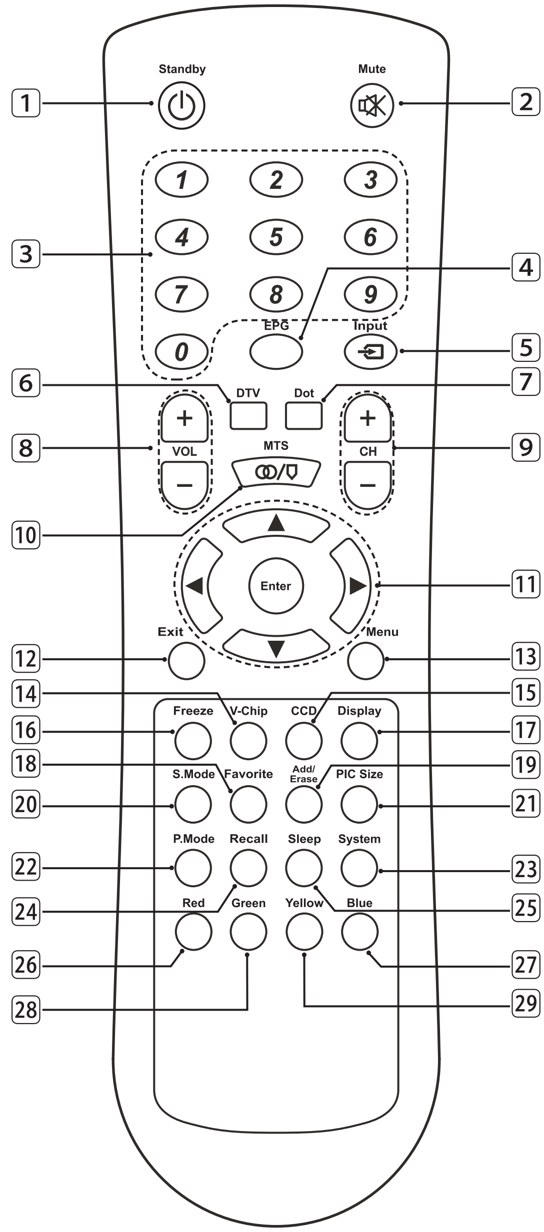
25 **Sleep**: Press repeatedly until it displays the time in minutes (5 Min, 10 Min, 15 Min, 30 Min, 60 Min, 90 Min, 120 Min and, OFF) that you want the TV to remain on before shutting off. To cancel sleep time, press SLEEP repeatedly until sleep OFF appears.

26 **Red**: Press this button to access the red item or page.

27 **Blue**: Press this button to access the blue item or page.

28 **Green**: Press this button to access the green item or page.

29 **Yellow**: Press this button to access the yellow item or page.



Note: Press ***CH +/-*** *on the remote control can turn on TV set from standby mode.*

Insertion of Batteries:

- Turn the remote control upside down, press and slide off the battery cover.
- Insert two 1.5V (AAA) batteries into the compartment, take care to observe the ⊕ and ⊖ markings indicated inside.
- Replace the cover and slide in reverse until the lock snaps.

PHYSICAL CHARACTERISTICS

14. Power Cord

Length : 1.8m nominal

Type : optional

15. Cabinet

15.1 Color : "Black" colour as defined by colour plaque reference number

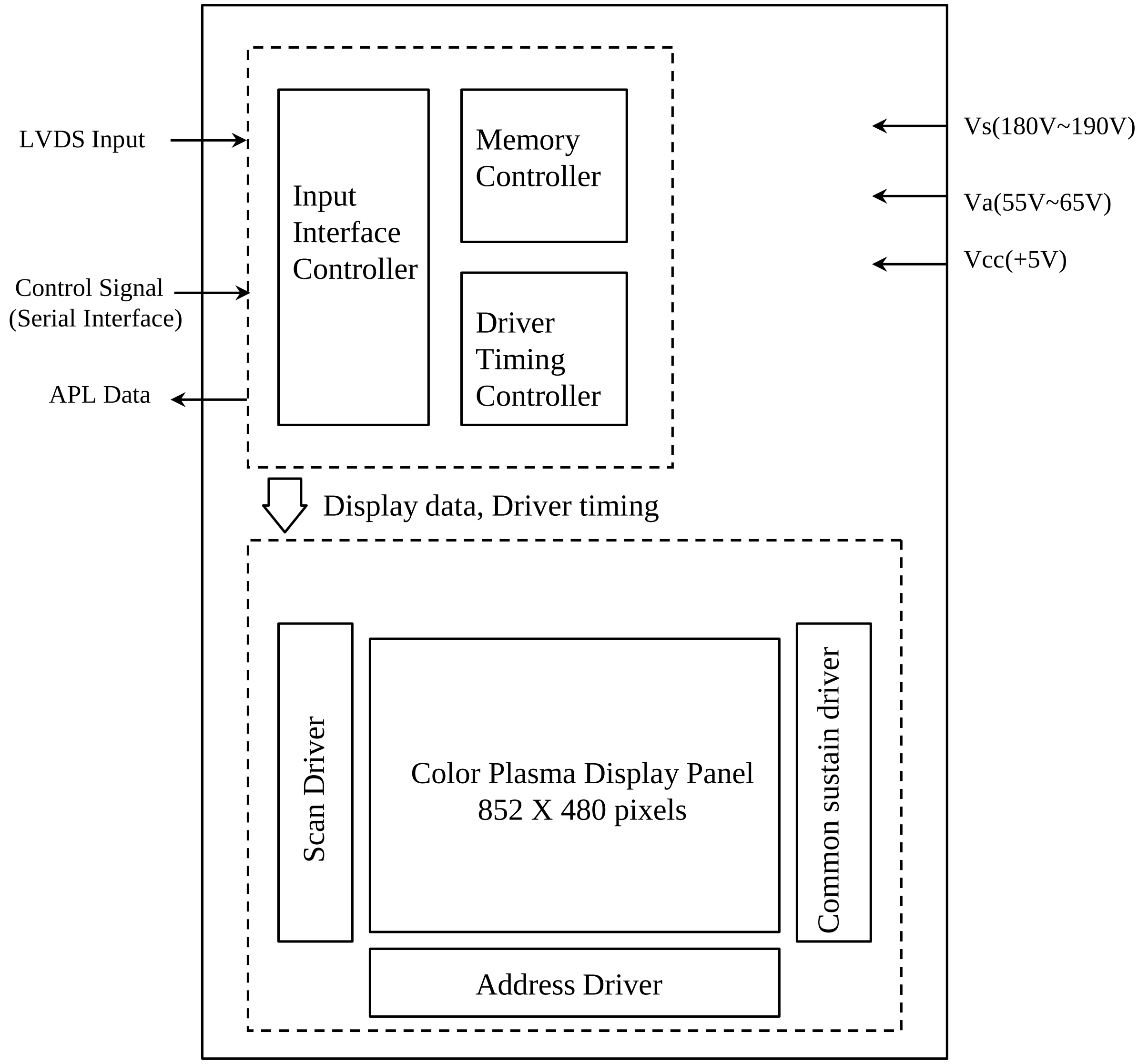
15.2 Weight

Net weight : 36.2 kg(with stand) /34.0kg(without stand)
Gross weight : 41.0 kg

15.3 Dimensions(with stand)

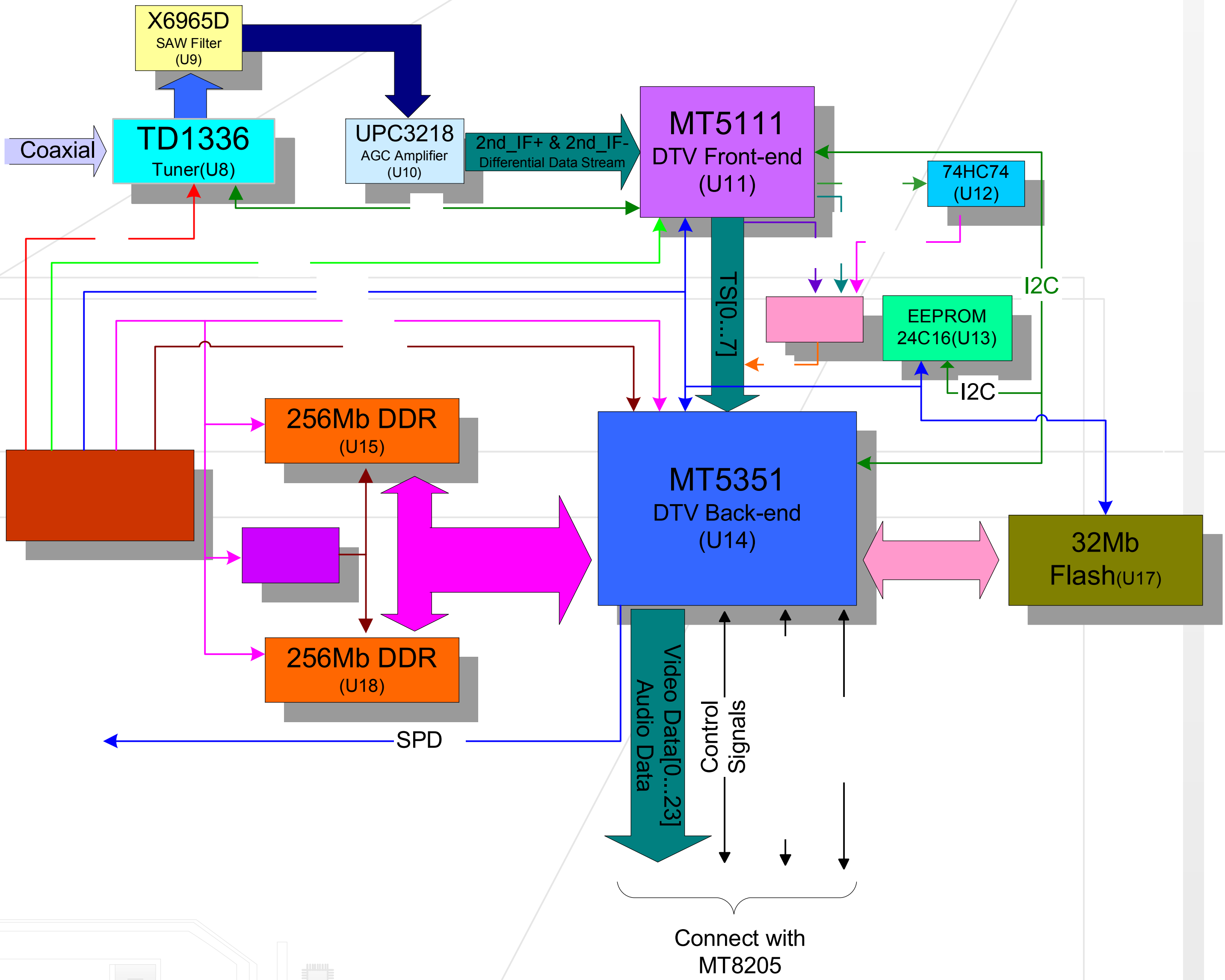
Width : 1040 mm
Height : 690 mm
Depth : 290 mm

Block Diagram

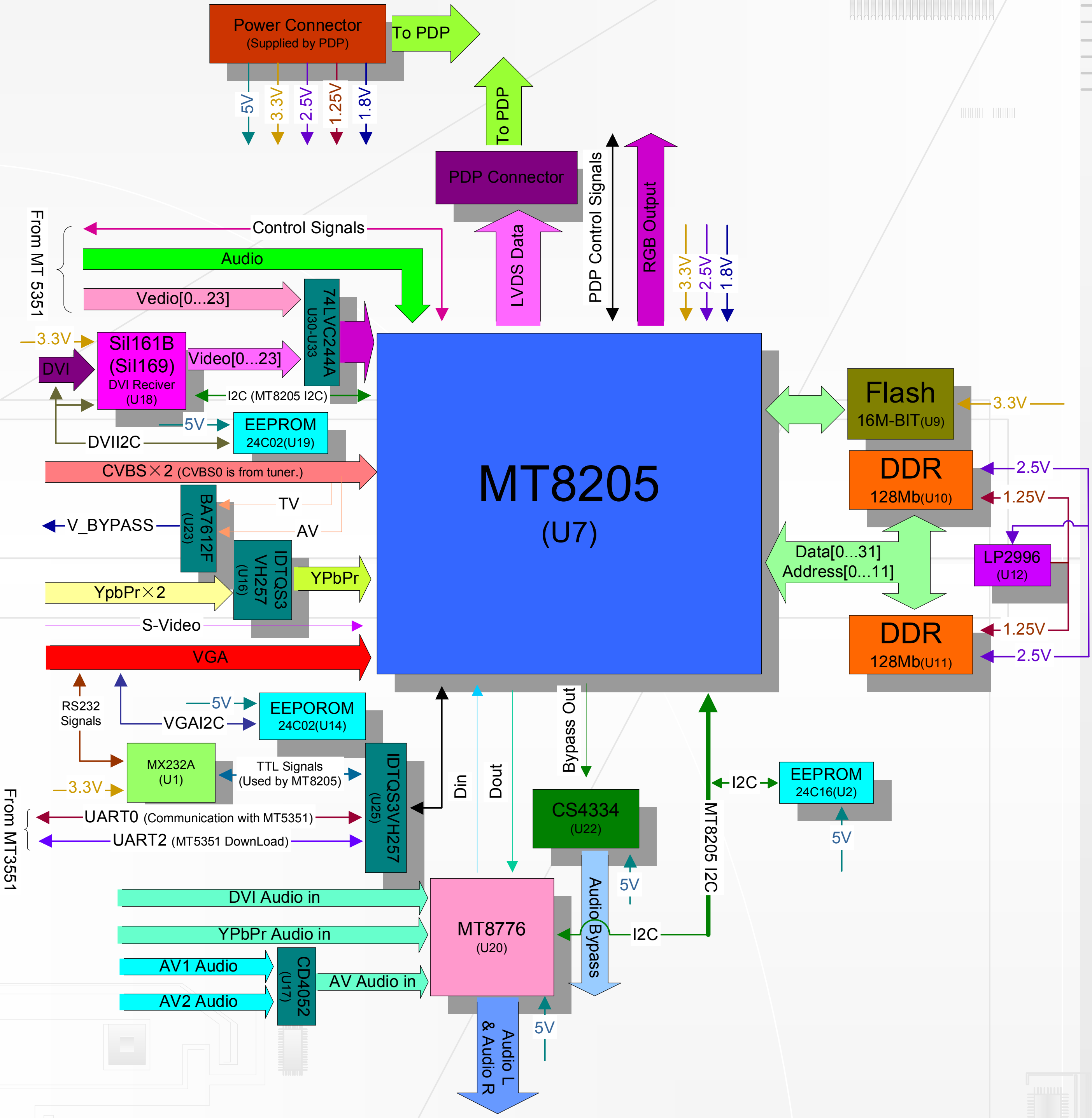


☞ Applied Voltage level is specified at the time when Full-White pattern is displayed on the panel.

Block Diagram

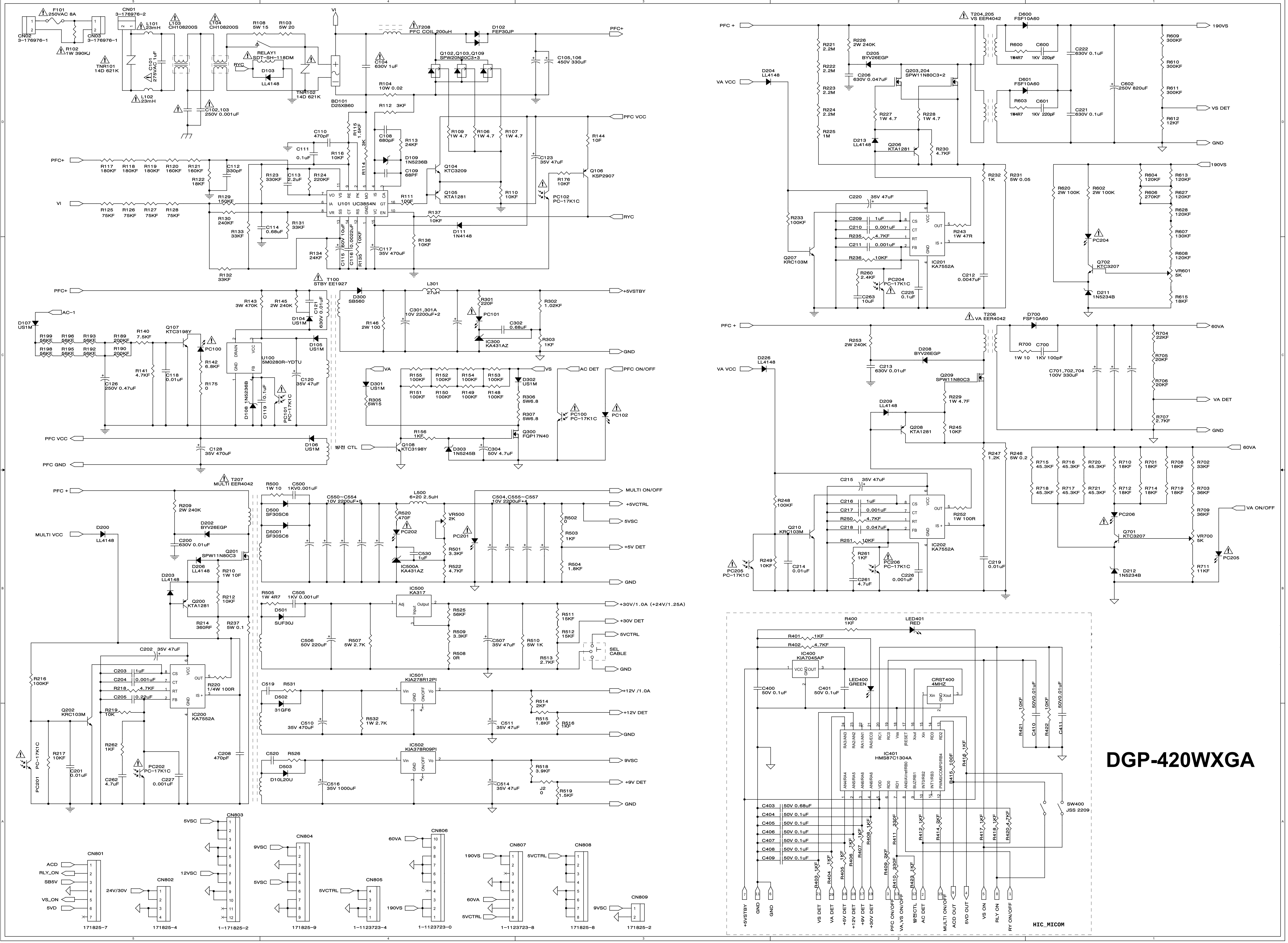


Block Diagram

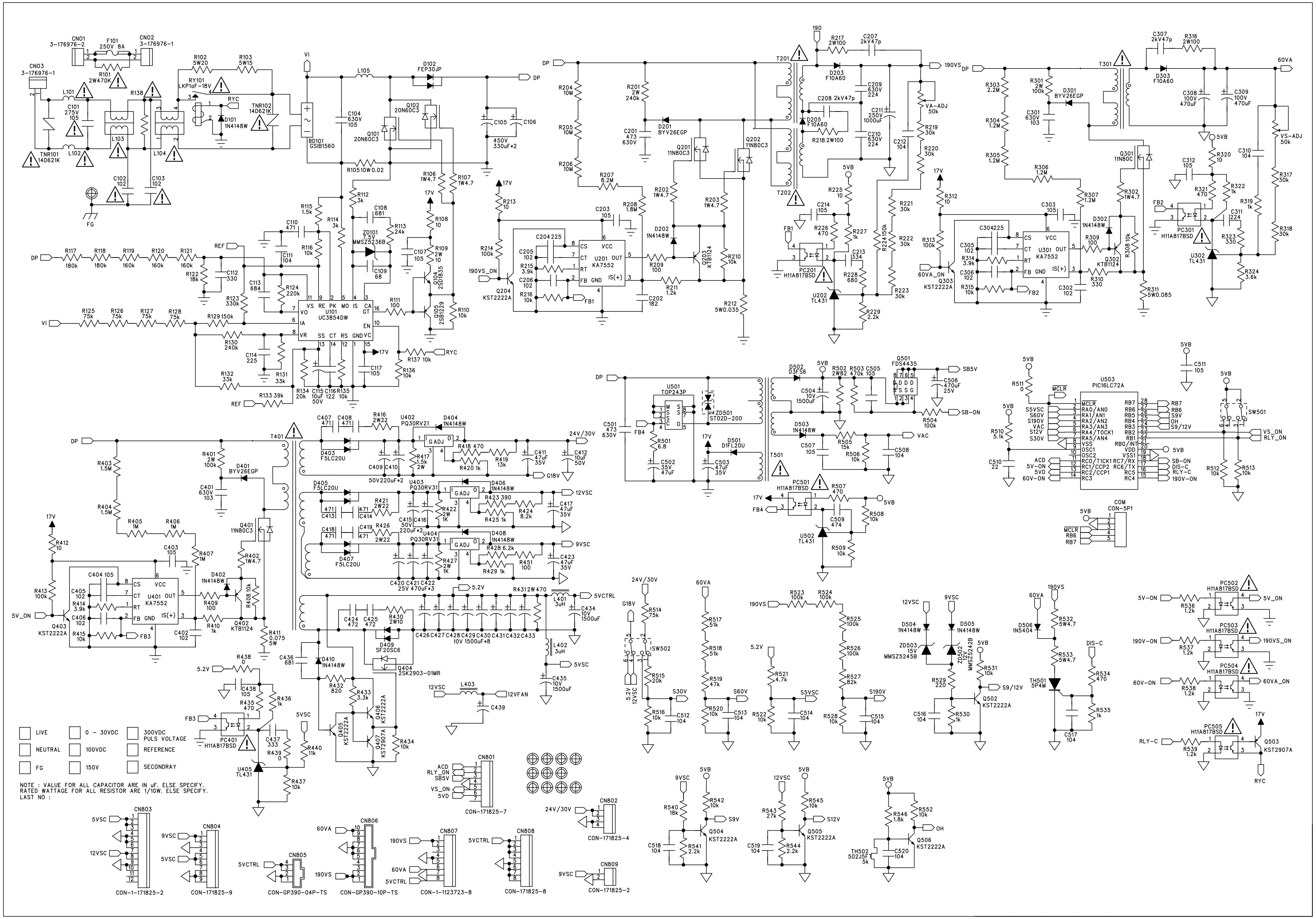


Circuit Diagram

- Power supply board of PDP Module, DGP-420WXGA
- Power supply board of PDP Module, USP490M-42LP
- Main (Video) board
- Audio/Tuner board
- ATSC board
- Keypad board
- Remote control receiver board
- External L/R Speakers board
- Remote control board



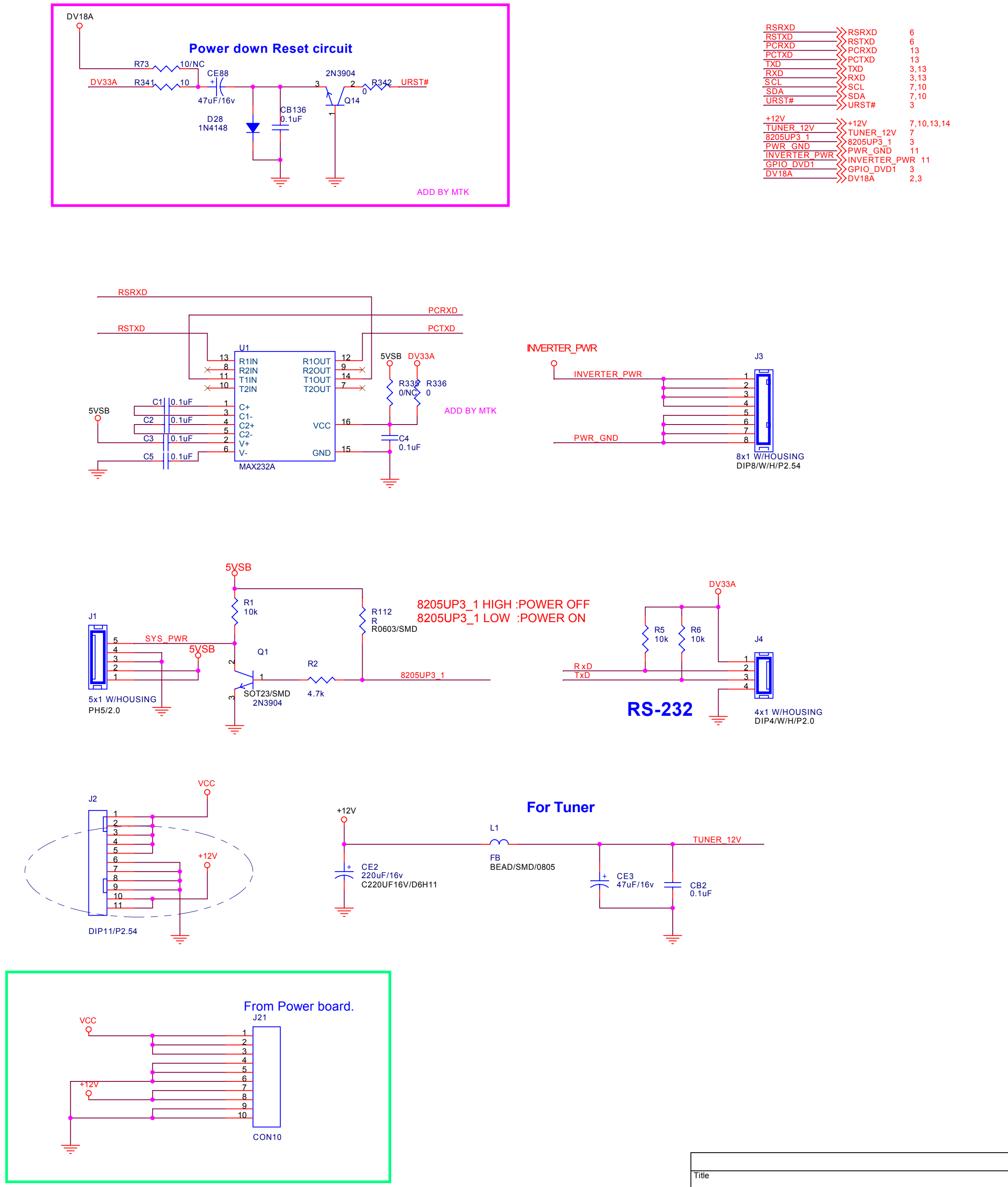
DGP-420WXGA
F101 250VAC 8A
CN01 3-176976-2
CN02 3-176976-1
CN03 3-176976-1
R102 1W 390KJ
TNR101 14D 621K
L101 23mH
L102 23mH
C101 275VAC 1uF
L103 CH108200S
L104 CH108200S
C102,103 250V 0.001uF
R108 5W 15
R103 5W 20
RELAY1 SDT-SH-118DM
RYC
D103 LL4148
TNR102 14D 621K
BD101 D25XB60
C104 630V 1uF
T208 PFC COIL 200uH
D102 FEP30JP
Q102,Q103,Q109 SPW20N60C3*3
C105,106 450V 330uF
PFC+
R104 10W 0.02
R112 3KF
PFC VCC
U101 UC3854N
Q104 KTC3209
Q105 KTA1281
Q106 KSP2907
PC102 PC-17K1C
D111 1N4148
C117 35V 470uF
T100 STBY EE1927
D300 SB560
L301 27uH
+5VSTBY
U100 5M0280R-YDTU
Q107 KTC3198Y
PC100
IC300 KA431AZ
PC101 PC-17K1C
D107 US1M
AC-1
GND
Q300 FQP17N40
Q108 KTC3198Y
AC DET
PFC ON/OFF
PFC GND
D106 US1M
C128 35V 470uF
T207 MULTI EER4042
MULTI VCC
D200 LL4148
Q201 SPW11N80C3
Q200 KTA1281
IC200 KA7552A
Q202 KRC103M
PC201 PC-17K1C
PC202 PC-17K1C
MULTI ON/OFF
+5VCTRL
5VSC
+5V DET
IC500A KA431AZ
IC500 KA317
+30V/1.0A (+24V/1.25A)
+30V DET
5VCTRL
SEL CABLE
IC501 KIA278R12PI
+12V /1.0A
+12V DET
IC502 KIA378R09PI
9VSC
+9V DET
CN801 171825-7
ACD
RLY_ON
SB5V
VS_ON
5VD
CN802 171825-4
24V/30V
CN803 1-171825-2
5VSC
12VSC
CN804 171825-9
CN805 1-1123723-4
CN806 1-1123723-0
60VA
190VS
CN807 1-1123723-8
CN808 171825-8
CN809 171825-2
T204,205 VS EER4042
D600 FSF10A60
D601 FSF10A60
190VS
VS DET
D204 LL4148
VA VCC
D205 BYV26EGP
Q203,204 SPW11N80C3*2
C602 250V 820uF
Q206 KTA1281
Q207 KRC103M
IC201 KA7552A
PC204 PC-17K1C
Q702 KTC3207
D211 1N5234B
VR601 5K
T206 VA EER4042
D700 FSF10A60
60VA
C701,702,704 100V 330uF
VA DET
D208 BYV26EGP
Q209 SPW11N80C3
Q208 KTA1281
Q210 KRC103M
IC202 KA7552A
PC205 PC-17K1C
PC206
Q701 KTC3207
VR700 5K
D212 1N5234B
VA ON/OFF
IC400 KIA7045AP
LED401 RED
LED400 GREEN
CRST400 4MHZ
IC401 HMS87C1304A
SW400 JSS 2209
+5VSTBY
VS DET
VA DET
+5V DET
+12V DET
+9V DET
+30V DET
PFC ON/OFF
VA,VS ON/OFF
AC DET
MULTI ON/OFF
ACD OUT
5VD OUT
VS ON
RLY ON
RY ON/OFF
HIC_MICOM

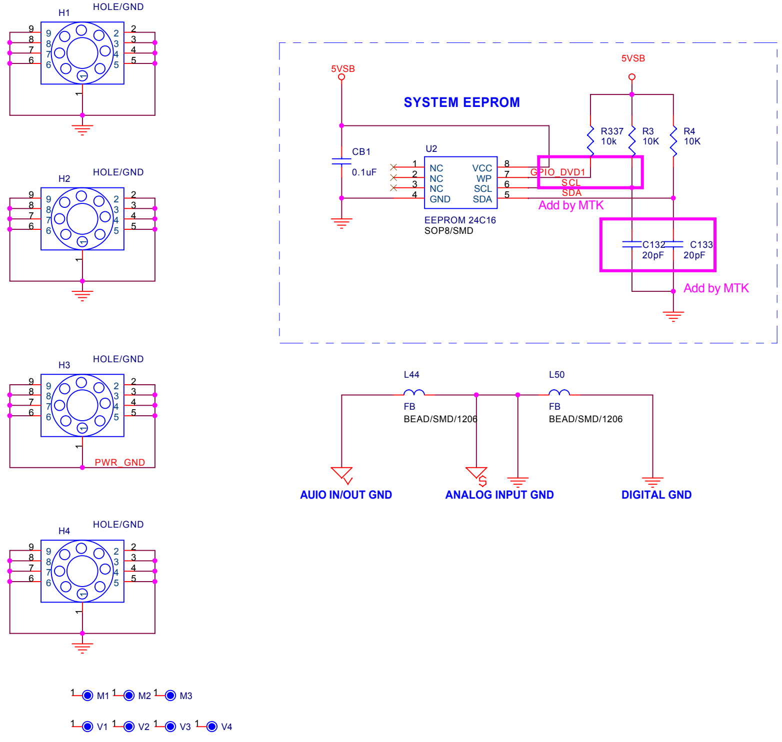


USP490M-42LP

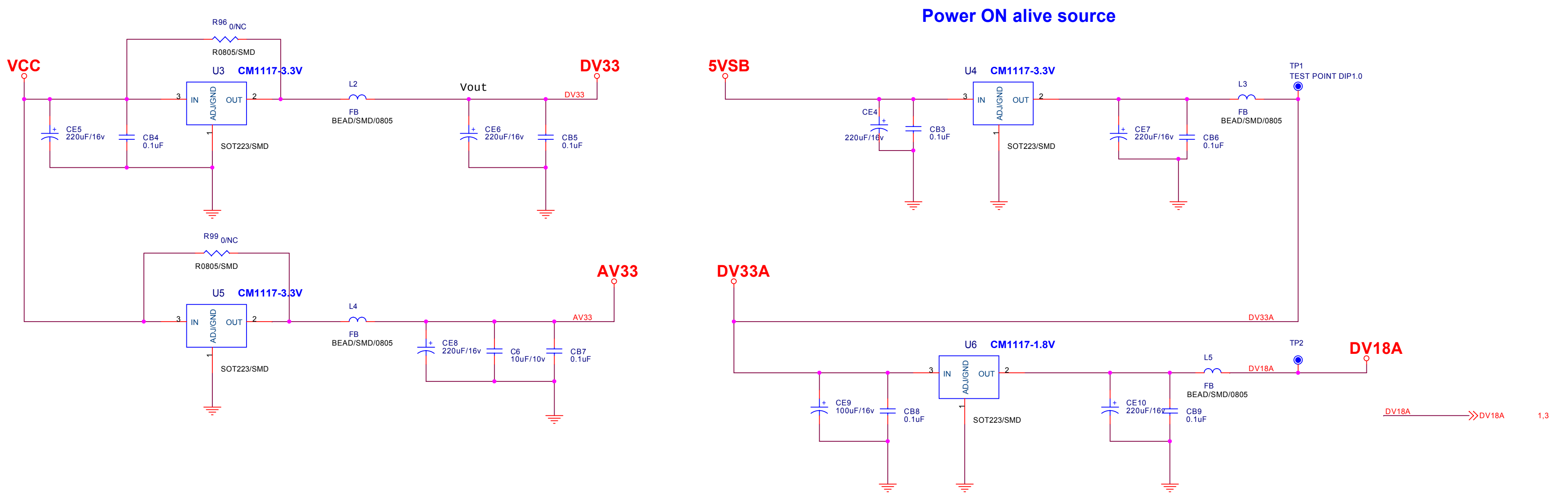
MT8205E (PBGA388) LCDTV BOARD 4 LAYERS

1. INDEX
2. LDO
3. MT8205E PBGA388
4. MT8205 ANALOG DECOUPLING
5. DDR MEMORY & FLASH
6. VGA IN & PC AUDIO IN
7. VIDEO IN & TUNER IO
8. AUDIO/VIDEO IN CIRCUIT
9. DVI INPUT
10. LVDS/CRT/TTL OUT
11. BACK LIGHT / KEYPAD
12. WM8776 & A/V BYPASS
13. ATSC INTERFACE
14. PDP INTERFACE

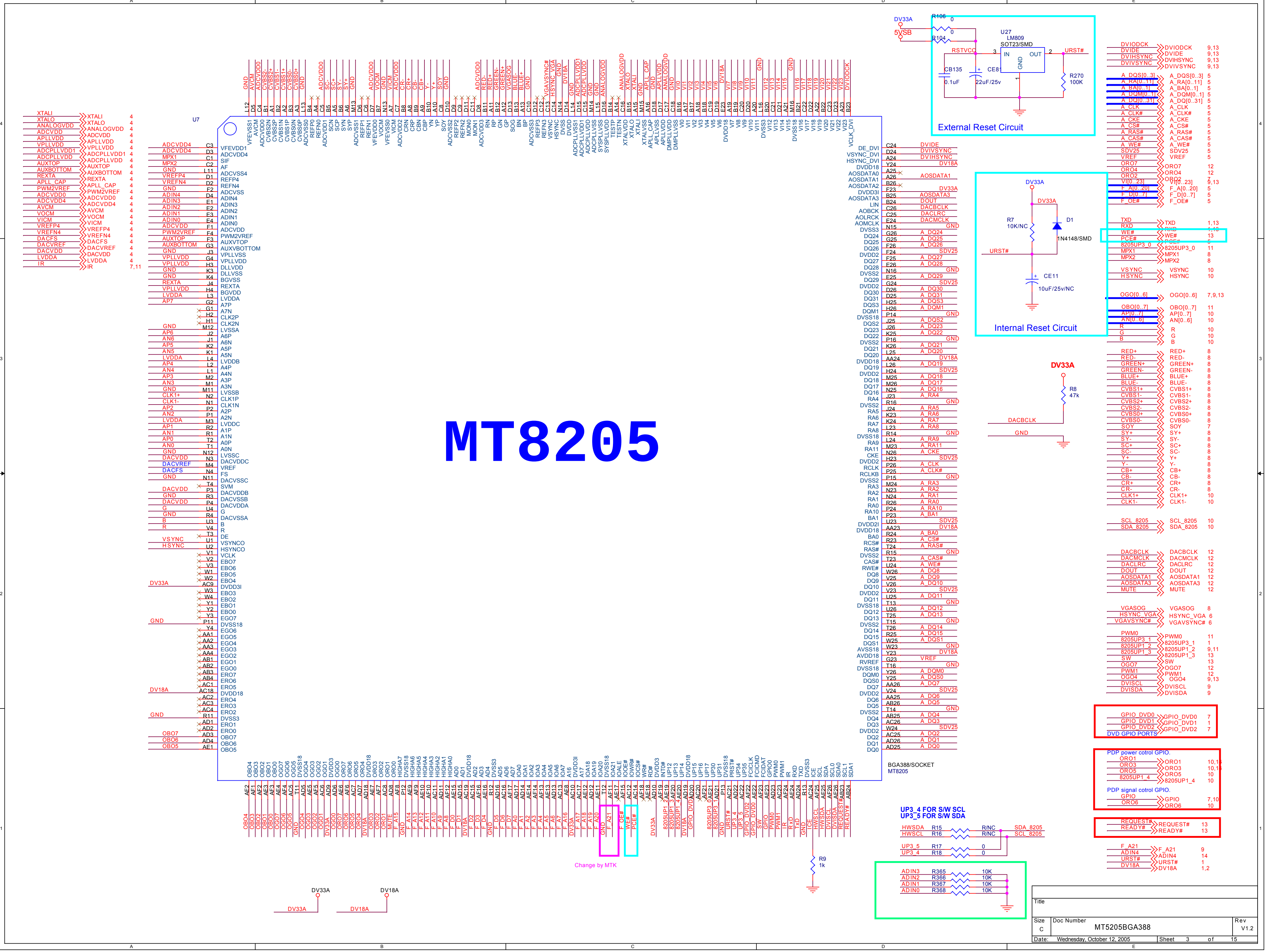




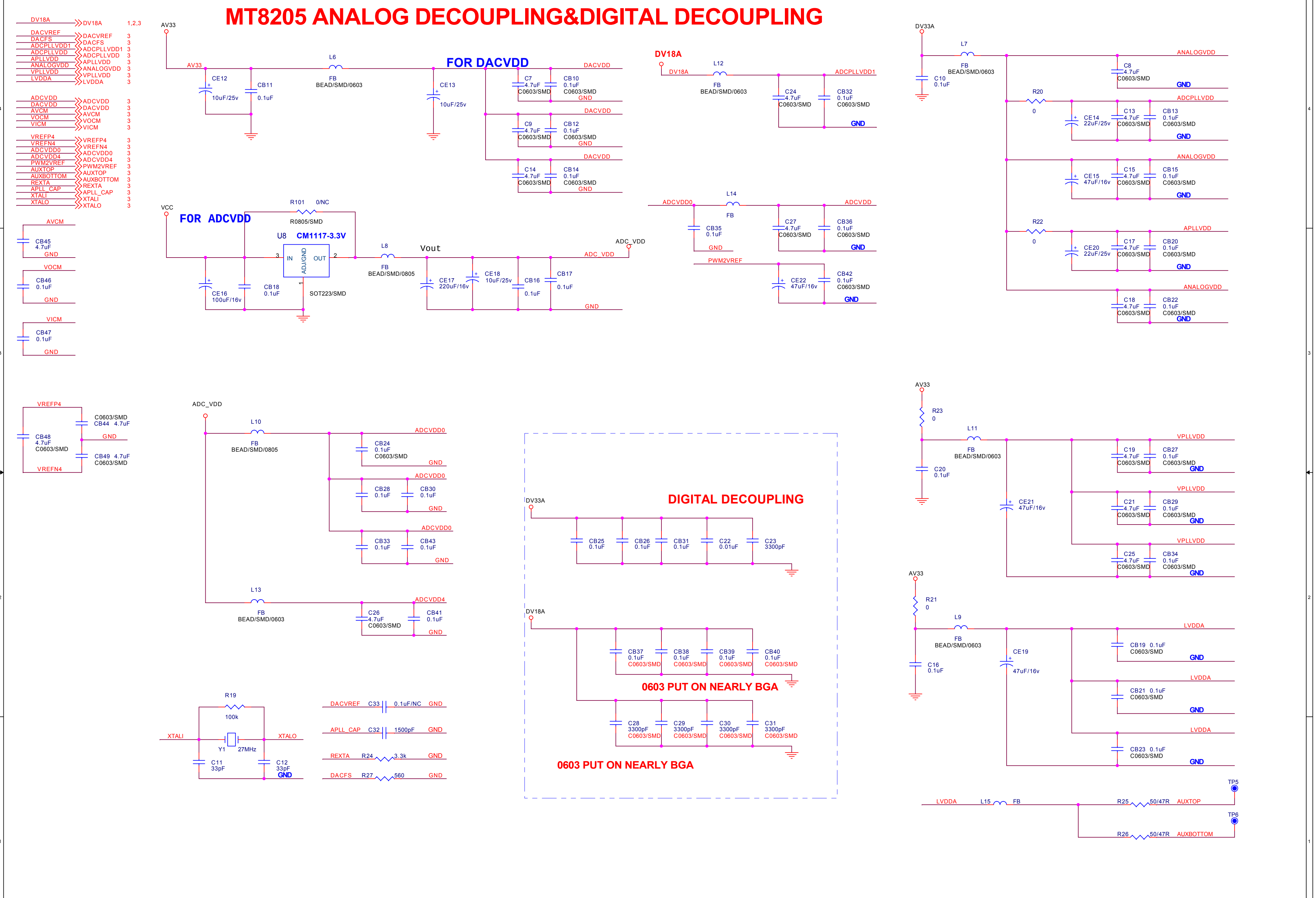
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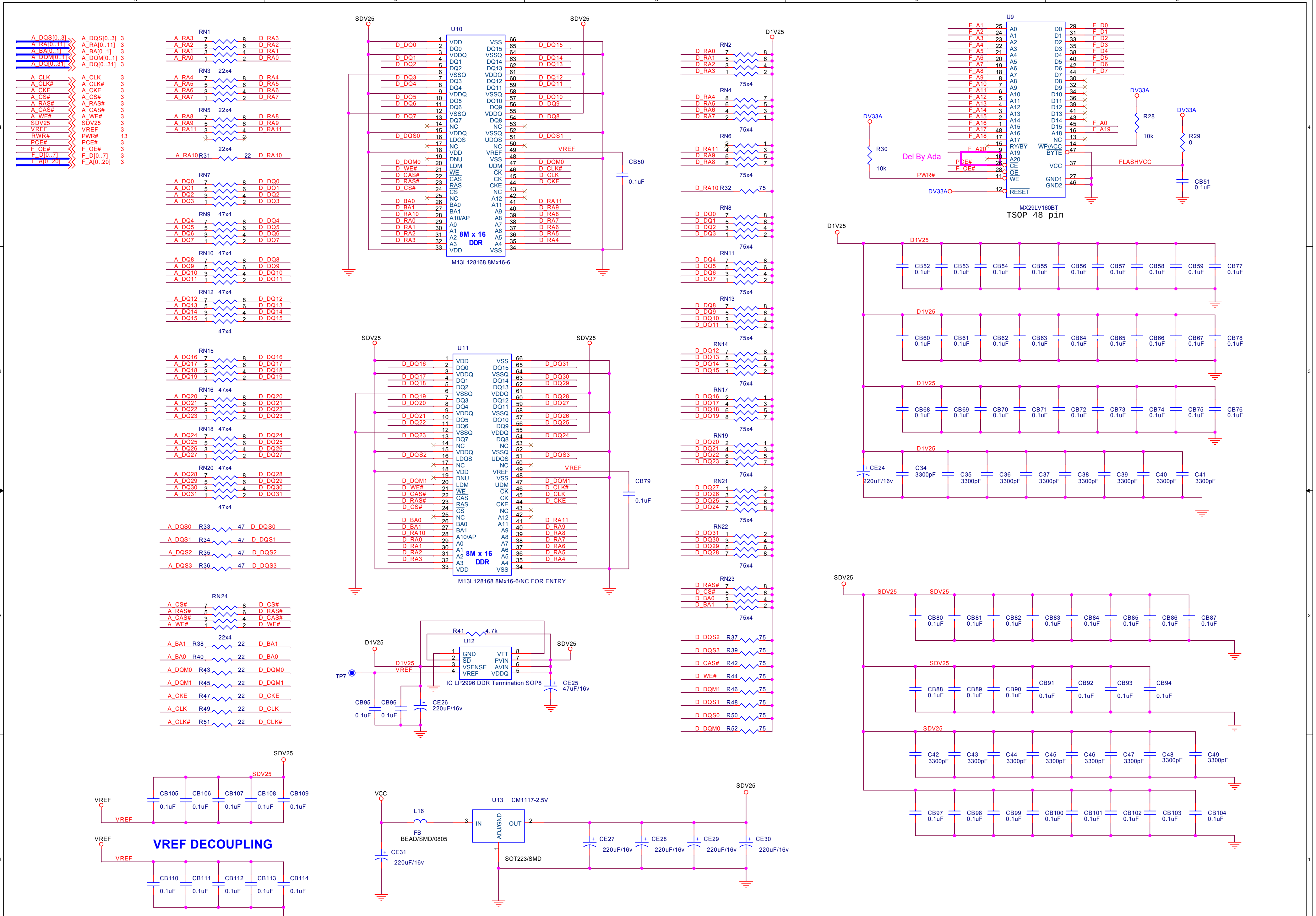
Title		
Size C	Doc Number LDO	Rev V1.2
Date: Wednesday, October 12, 2005	Sheet 2 of 15	


MT8205
U7
BGA388/SOCKET
MT8205
External Reset Circuit
U27
LM809
SOT23/SMD
RSTVCC
URST#
R106
R104
R270
100K
CB135
0.1uF
CE81
22uF/25v
DV33A
5VSB
Internal Reset Circuit
R7
10K/NC
D1
1N4148/SMD
CE11
10uF/25v/NC
R8
47k
DACBCLK
GND
UP3_4 FOR S/W SCL
UP3_5 FOR S/W SDA
HWSDA
HWSCL
SDA_8205
SCL_8205
R15
R16
R17
R18
R/NC
ADIN3
ADIN2
ADIN1
ADIN0
R365
R366
R367
R368
10K
R9
1k
DVD GPIO PORTS
GPIO_DVD0
GPIO_DVD1
GPIO_DVD2
PDP power cotrol GPIO.
ORO1
ORO3
ORO5
8205UP1_4
PDP signal cotrol GPIO.
GPIO
ORO6
REQUEST#
READY#
Change by MTK
DV33A
DV18A
Title
Size
C
Doc Number
MT5205BGA388
Rev
V1.2
Date: Wednesday, October 12, 2005
Sheet 3 of 15

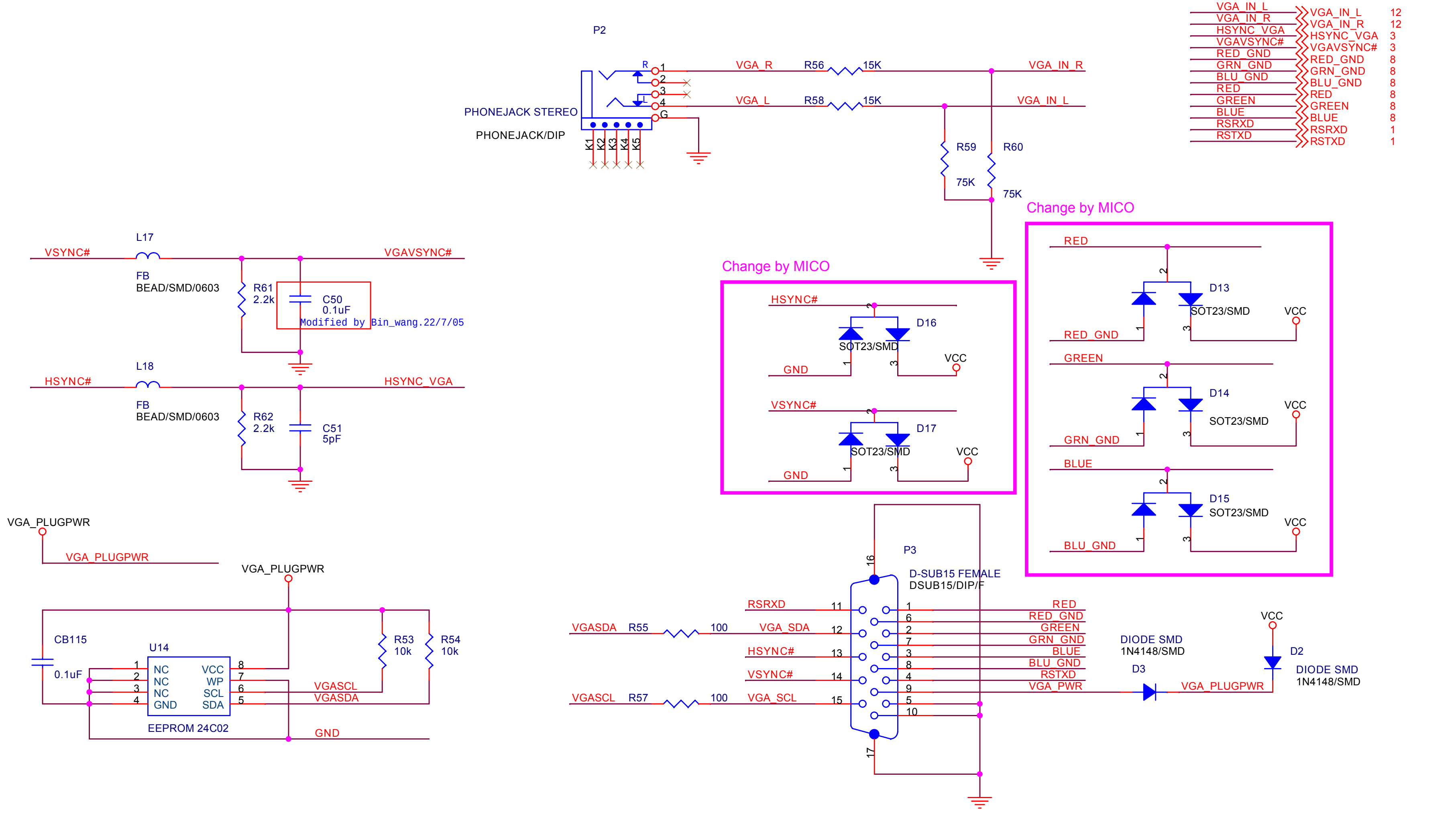
MT8205 ANALOG DECOUPLING&DIGITAL DECOUPLING



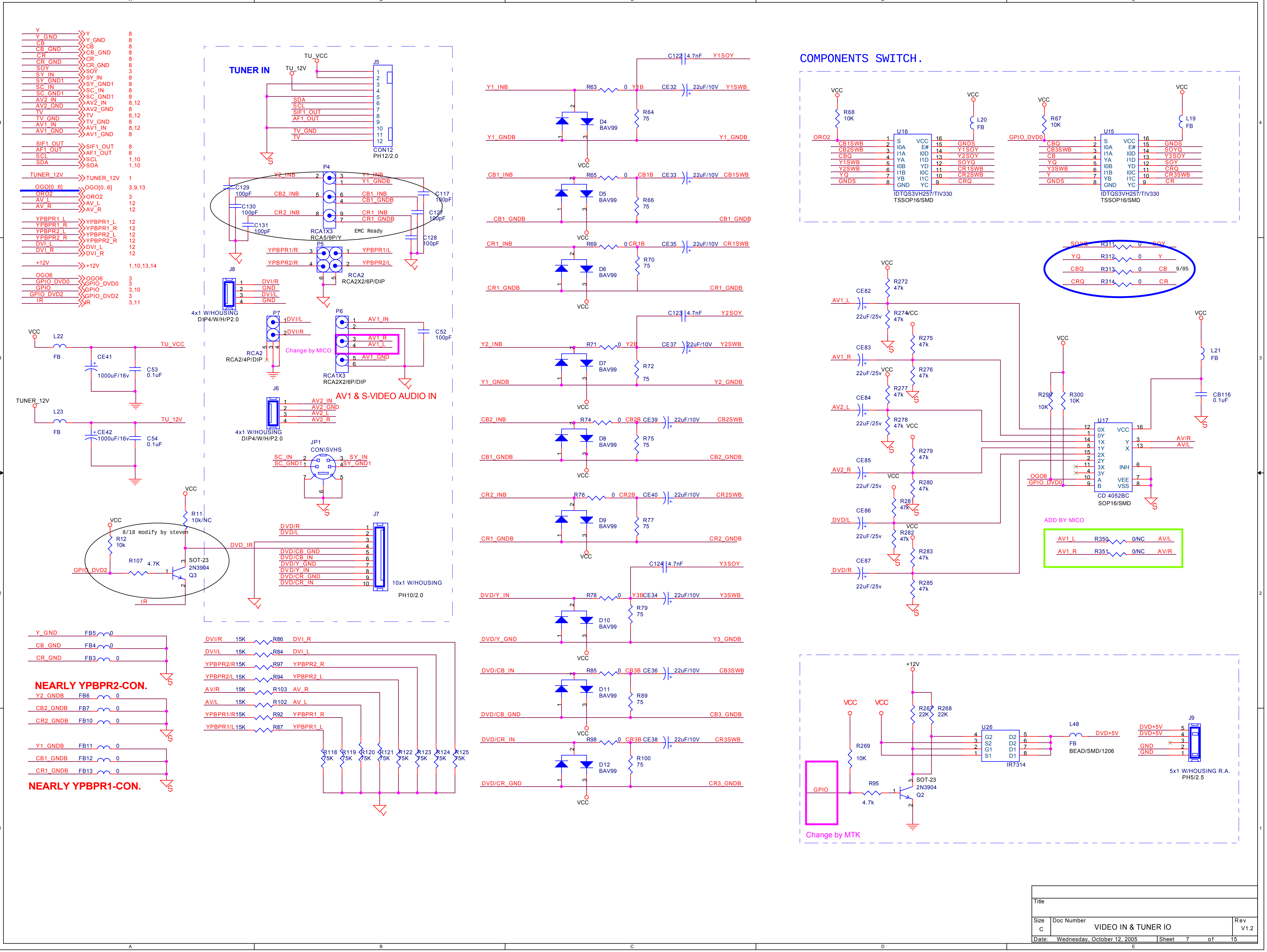
Title		
Size C	Doc Number MT8205 DECOUPOMG--ANALOG	Rev V1.2
Date: Wednesday, October 12, 2005	Sheet 4 of 15	



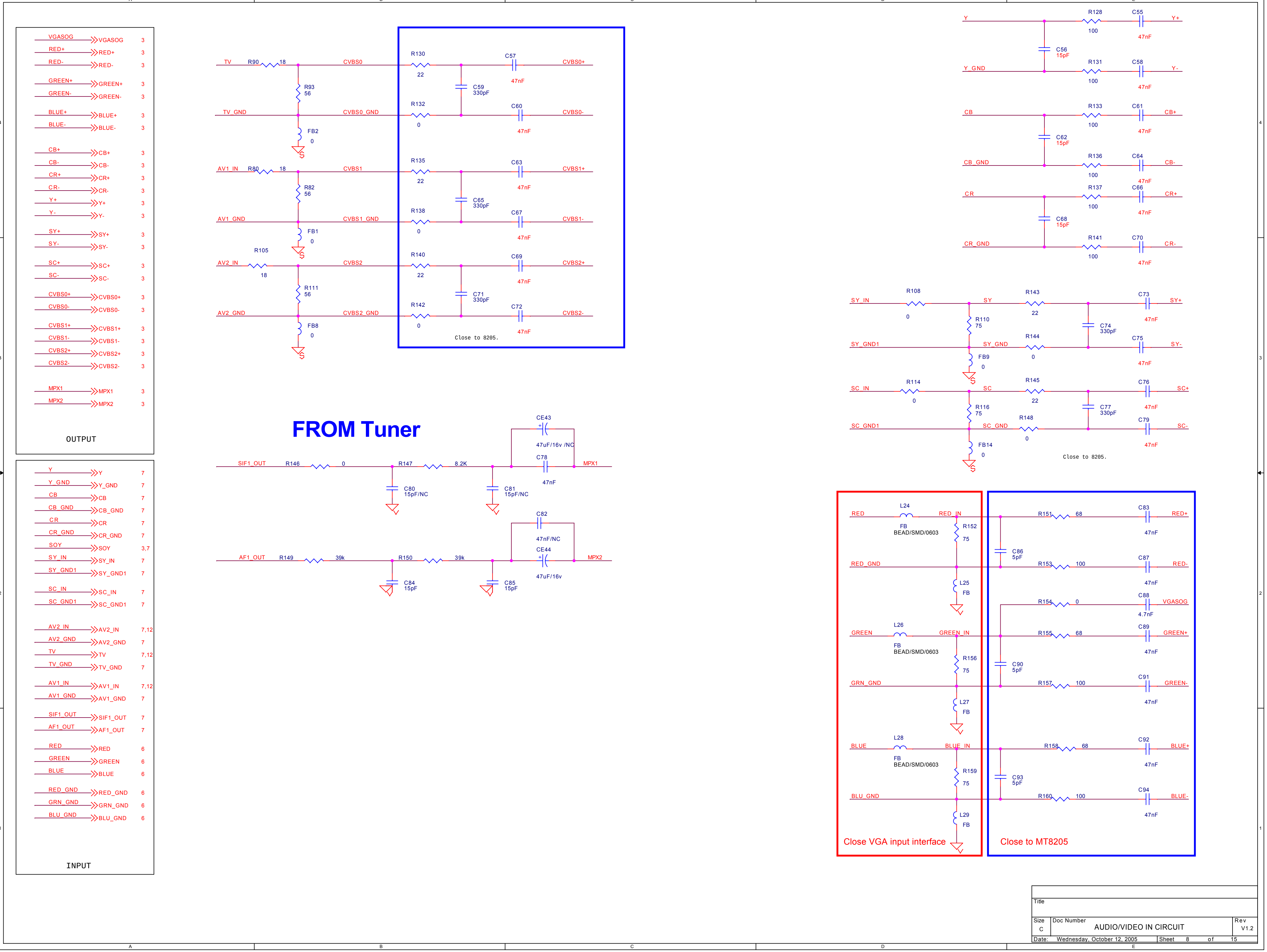
Title	
Size C	Doc Number DDR MEMORY&FLASH
Rev	V1.2
Date:	Wednesday, October 12, 2005
Sheet	5 of 15

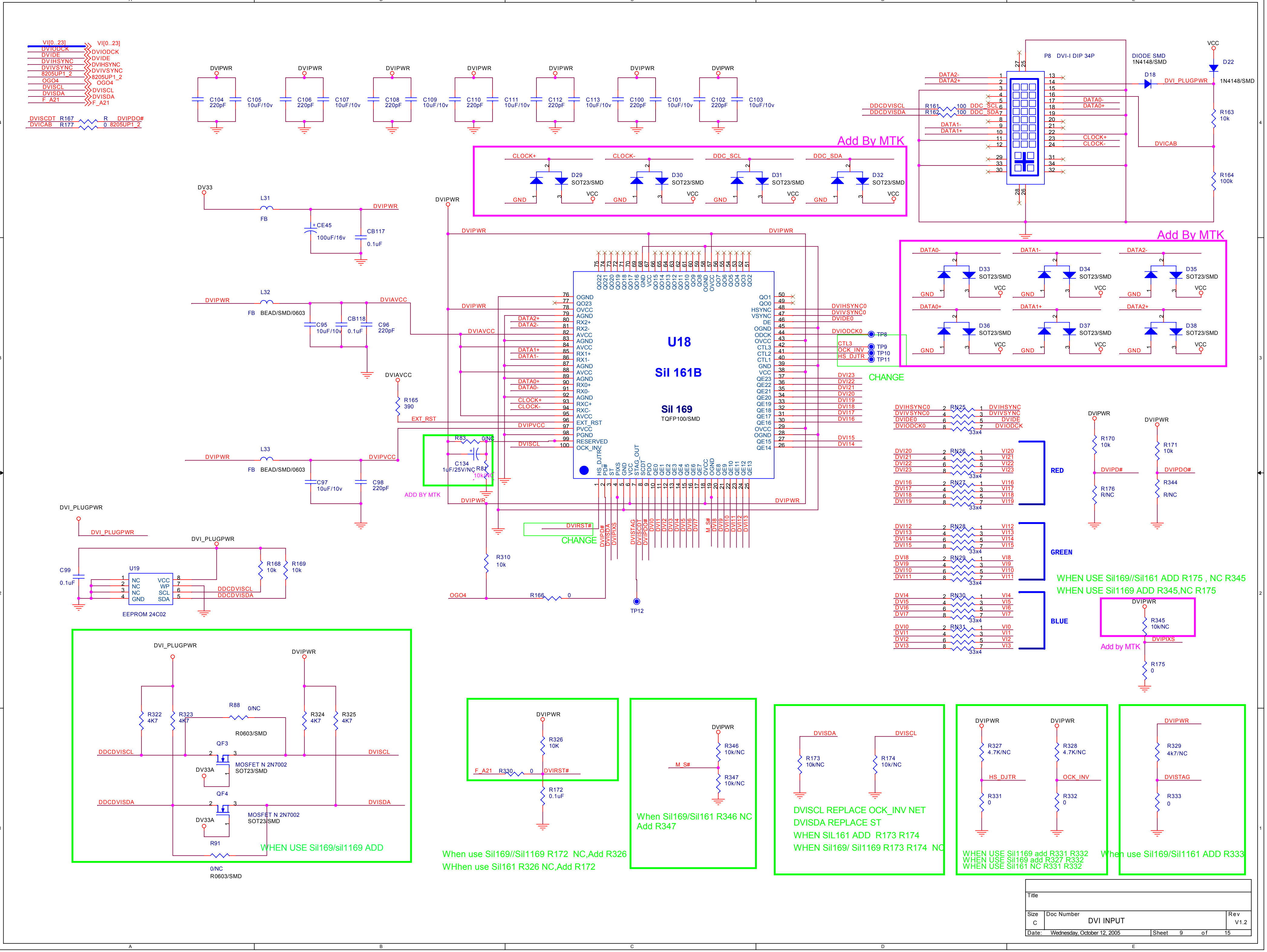


Title		
Size B	Doc Number: VGA IN&PC AUDIO IN	Rev V1.2
Date: Wednesday, October 12, 2005	Sheet 6 of 15	

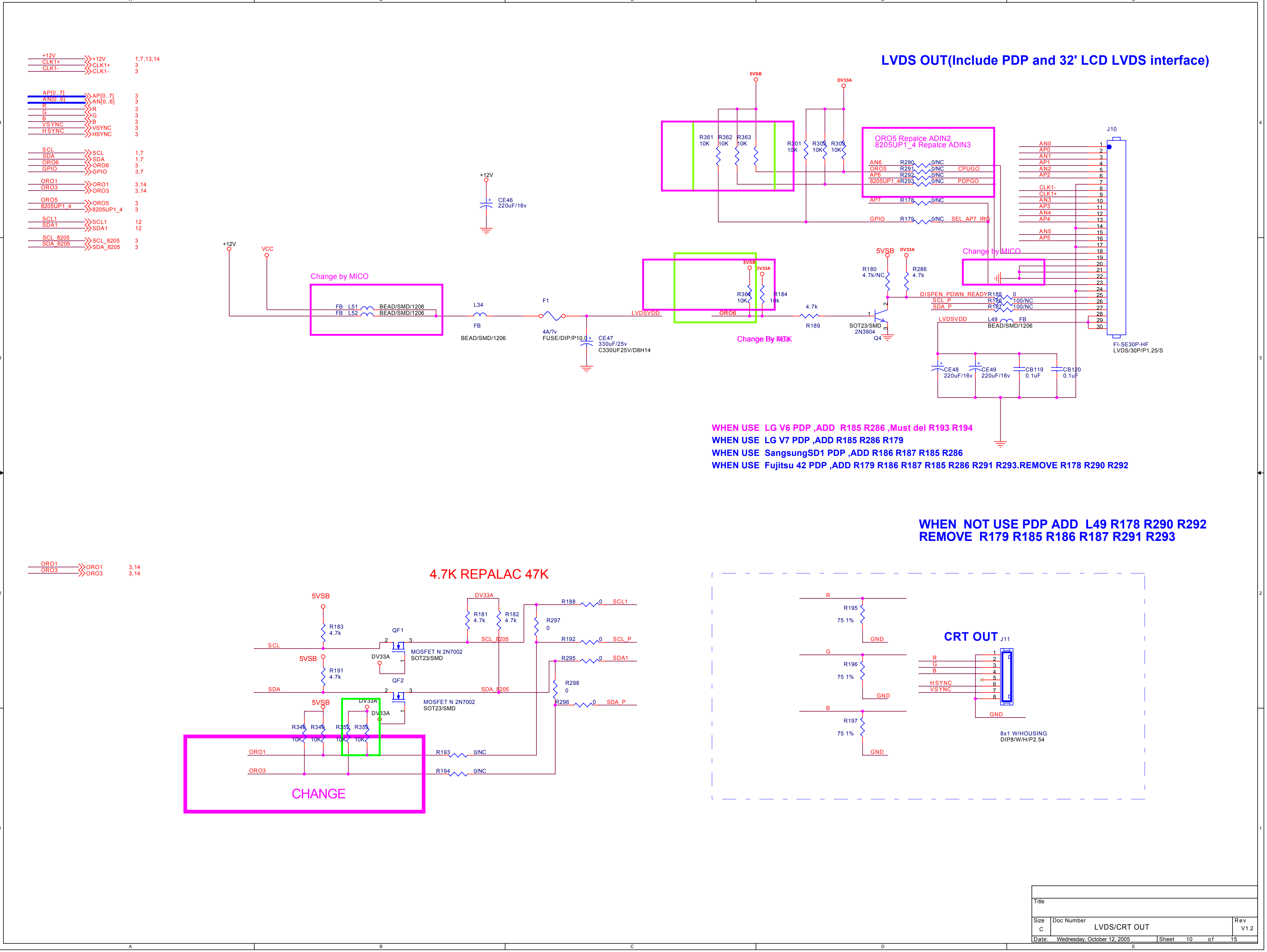


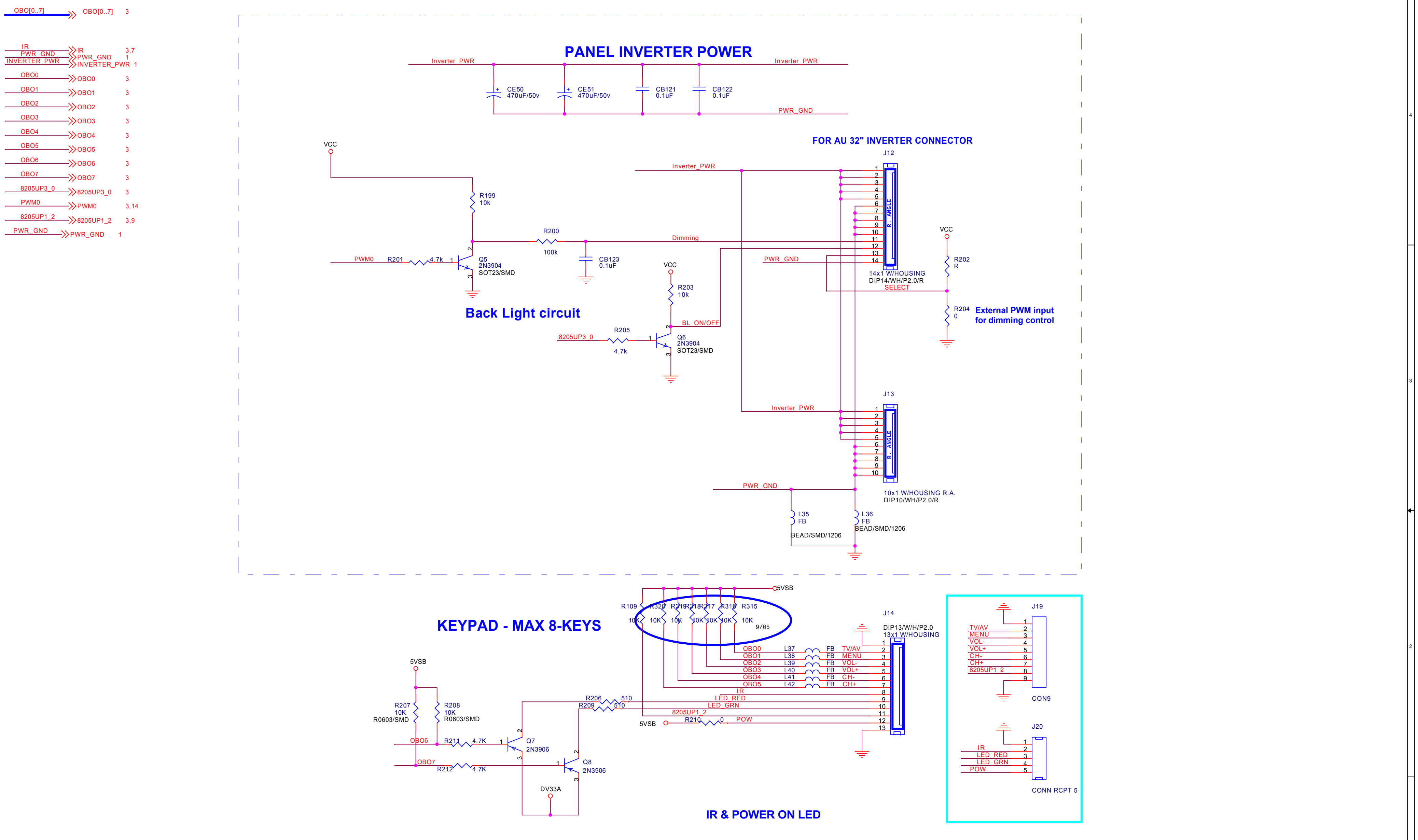
TUNER IN
COMPONENTS SWITCH.
AV1 & S-VIDEO AUDIO IN
NEARLY YPBPR2-CON.
NEARLY YPBPR1-CON.
ADD BY MICO
Change by MICO
Change by MTK
EMC Ready
8/18 modify by steven
Title
VIDEO IN & TUNER IO
Size C
Doc Number
Rev V1.2
Date: Wednesday, October 12, 2005
Sheet 7 of 15


OUTPUT
VGASOG
RED+
RED-
GREEN+
GREEN-
BLUE+
BLUE-
CB+
CB-
CR+
CR-
Y+
Y-
SY+
SY-
SC+
SC-
CVBS0+
CVBS0-
CVBS1+
CVBS1-
CVBS2+
CVBS2-
MPX1
MPX2
INPUT
Y
Y_GND
CB
CB_GND
CR
CR_GND
SOY
SY_IN
SY_GND1
SC_IN
SC_GND1
AV2_IN
AV2_GND
TV
TV_GND
AV1_IN
AV1_GND
SIF1_OUT
AF1_OUT
RED
GREEN
BLUE
RED_GND
GRN_GND
BLU_GND
Close to 8205.
FROM Tuner
47uF/16v /NC
47nF/NC
47uF/16v
Close VGA input interface
Close to MT8205
FB
BEAD/SMD/0603
Title
Size C
Doc Number
AUDIO/VIDEO IN CIRCUIT
Rev V1.2
Date: Wednesday, October 12, 2005
Sheet 8 of 15

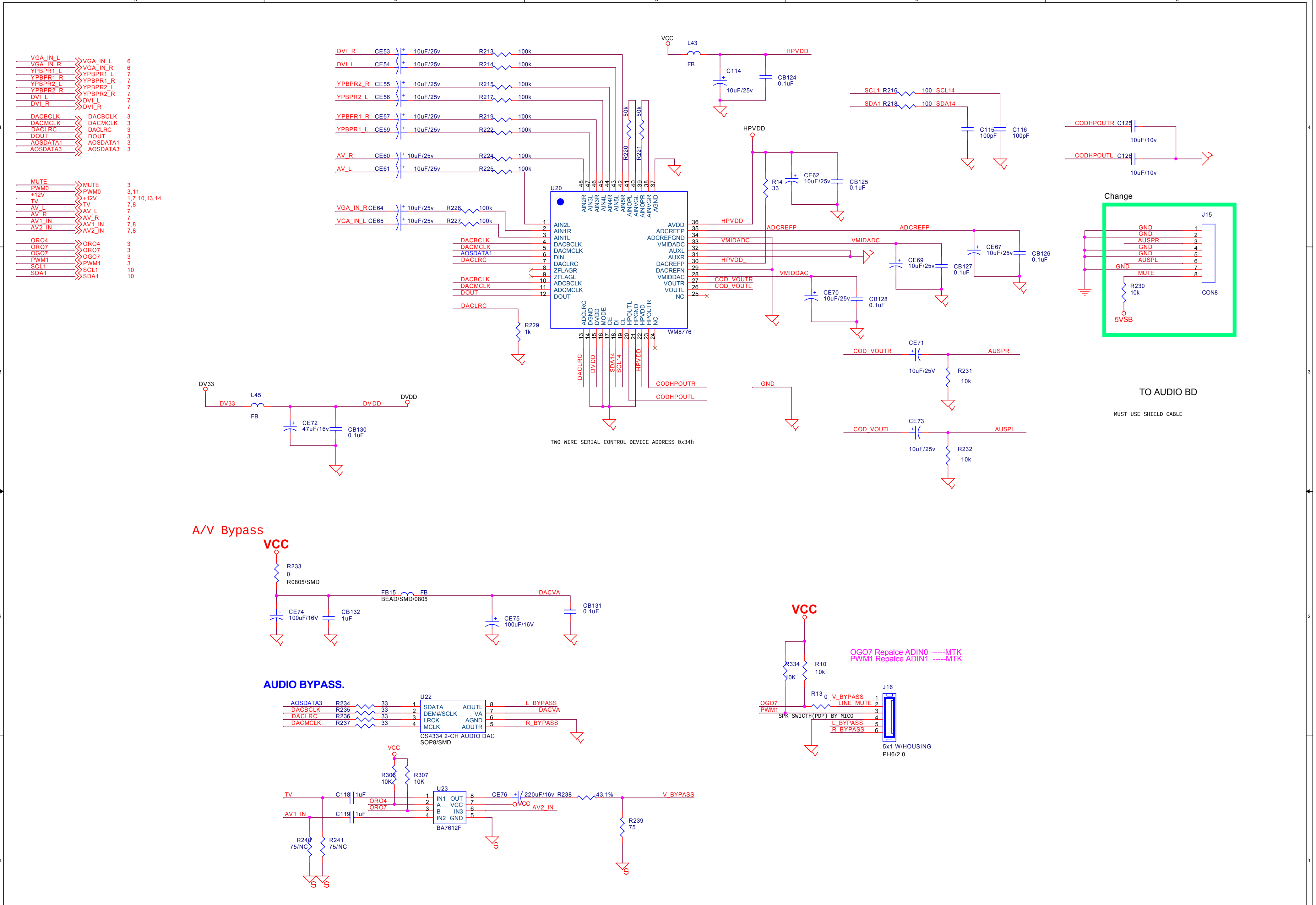


P8 DVI-I DIP 34P
DIODE SMD 1N4148/SMD
D18
D22
1N4148/SMD
DVI_PLUGPWR
Add By MTK
D29 SOT23/SMD
D30 SOT23/SMD
D31 SOT23/SMD
D32 SOT23/SMD
CLOCK+
CLOCK-
DDC_SCL
DDC_SDA
DDCDVISCL
DDCDVISDA
DVICAB
U18
Sil 161B
Sil 169
TQFP100/SMD
DVIPWR
DVIAVCC
DVIPVCC
DV33
L31 FB
L32 FB BEAD/SMD/0603
L33 FB BEAD/SMD/0603
CE45 100uF/16v
CB117 0.1uF
R165 390
EXT_RST
C134 1uF/25V/NC
R83 0/NC
ADD BY MTK
CHANGE
TP8
TP9
TP10
TP11
TP12
DVIRST#
R310 10k
R166 0
OGO4
U19
EEPROM 24C02
R168 10k
R169 10k
C99 0.1uF
RN25 33x4
RN26 33x4
RN27 33x4
RN28 33x4
RN29 33x4
RN30 33x4
RN31 33x4
RED
GREEN
BLUE
D33 SOT23/SMD
D34 SOT23/SMD
D35 SOT23/SMD
D36 SOT23/SMD
D37 SOT23/SMD
D38 SOT23/SMD
DATA0-
DATA1-
DATA2-
DATA0+
DATA1+
DATA2+
R170 10k
R171 10k
R176 R/NC
R344 R/NC
DVIPD#
DVIPDO#
WHEN USE Sil169//Sil161 ADD R175 , NC R345
WHEN USE Sil1169 ADD R345,NC R175
R345 10k/NC
DVIPIXS
Add by MTK
R175 0
DVI_PLUGPWR
R322 4K7
R323 4K7
R88 0/NC
R0603/SMD
R324 4K7
R325 4K7
QF3
MOSFET N 2N7002 SOT23/SMD
QF4
MOSFET N 2N7002 SOT23/SMD
DV33A
R91
0/NC
R0603/SMD
DVISCL
DVISDA
WHEN USE Sil169/sil1169 ADD
R326 10K
F_A21 R330 0 DVIRST#
R172 0.1uF
When use Sil169//Sil1169 R172 NC,Add R326
WHhen use Sil161 R326 NC,Add R172
M_S#
R346 10k/NC
R347 10k/NC
When Sil169/Sil161 R346 NC
Add R347
R173 10k/NC
R174 10k/NC
DVISCL REPLACE OCK_INV NET
DVISDA REPLACE ST
WHEN SIL161 ADD R173 R174
WHEN Sil169/ Sil1169 R173 R174 NC
R327 4.7K/NC
R328 4.7K/NC
HS_DJTR
OCK_INV
R331 0
R332 0
WHEN USE Sil1169 add R331 R332
WHEN USE Sil169 add R327 R332
WHEN USE Sil161 NC R331 R332
R329 4k7/NC
DVISTAG
R333 0
When use Sil169/Sil1161 ADD R333
Title
Size C
Doc Number
DVI INPUT
Rev V1.2
Date: Wednesday, October 12, 2005
Sheet 9 of 15

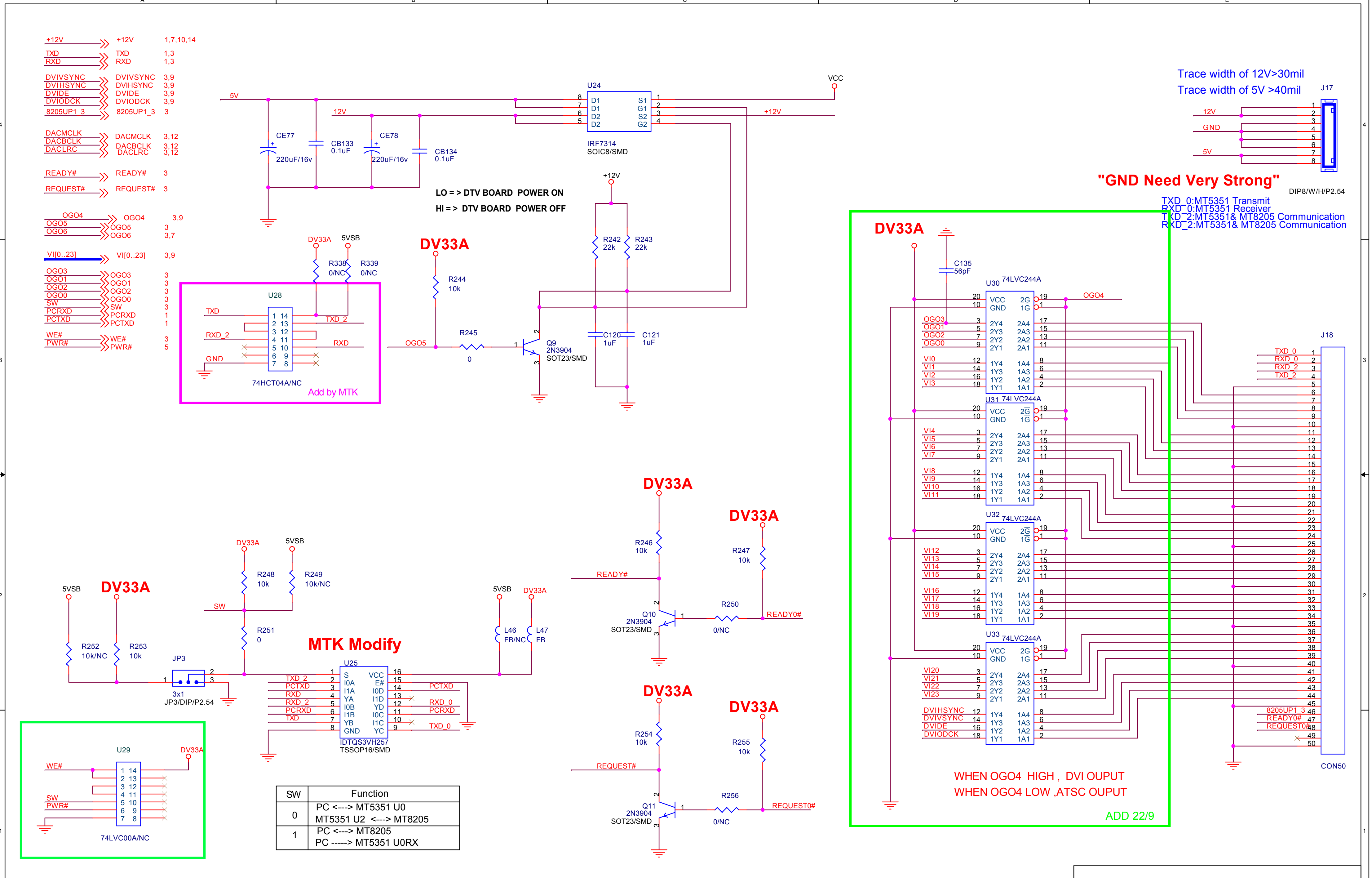

LVDS OUT(Include PDP and 32' LCD LVDS interface)
+12V
CLK1+
CLK1-
AP[0..7]
AN[0..6]
R
G
B
VSYNC
HSYNC
SCL
SDA
ORO6
GPIO
ORO1
ORO3
ORO5
8205UP1_4
SCL1
SDA1
SCL_8205
SDA_8205
ORO5 Repalce ADIN2
8205UP1_4 Repalce ADIN3
Change by MICO
Change By MICO
CE46 220uF/16v
CE47 330uF/25v C330UF25V/D8H14
F1 4A/7v FUSE/DIP/P10.0
L34 FB BEAD/SMD/1206
L51 BEAD/SMD/1206
L52 BEAD/SMD/1206
LVDSVDD
Q4 SOT23/SMD 2N3904
DISPEN_PDWN_READY
J10 FI-SE30P-HF LVDS/30P/P1.25/S
CE48 220uF/16v
CE49 220uF/16v
CB119 0.1uF
CB120 0.1uF
WHEN USE LG V6 PDP ,ADD R185 R286 ,Must del R193 R194
WHEN USE LG V7 PDP ,ADD R185 R286 R179
WHEN USE SangsungSD1 PDP ,ADD R186 R187 R185 R286
WHEN USE Fujitsu 42 PDP ,ADD R179 R186 R187 R185 R286 R291 R293.REMOVE R178 R290 R292
WHEN NOT USE PDP ADD L49 R178 R290 R292
REMOVE R179 R185 R186 R187 R291 R293
4.7K REPALAC 47K
QF1 MOSFET N 2N7002 SOT23/SMD
QF2 MOSFET N 2N7002 SOT23/SMD
CHANGE
CRT OUT
J11 8x1 W/HOUSING DIP8/W/H/P2.54
R195 75 1%
R196 75 1%
R197 75 1%
GND
Title
Size C
Doc Number LVDS/CRT OUT
Rev V1.2
Date: Wednesday, October 12, 2005
Sheet 10 of 15



Title		
Size: C	Doc Number: BACK_LIGHT/KEYPAD	Rev: V1.2
Date: Wednesday, October 12, 2005	Sheet 11 of 15	



Title			
Size: C	Doc Number: WM8776/WM8766/AUDIO CODEC		Rev: V1.2
Date: Wednesday, October 12, 2005	Sheet 12 of 15		

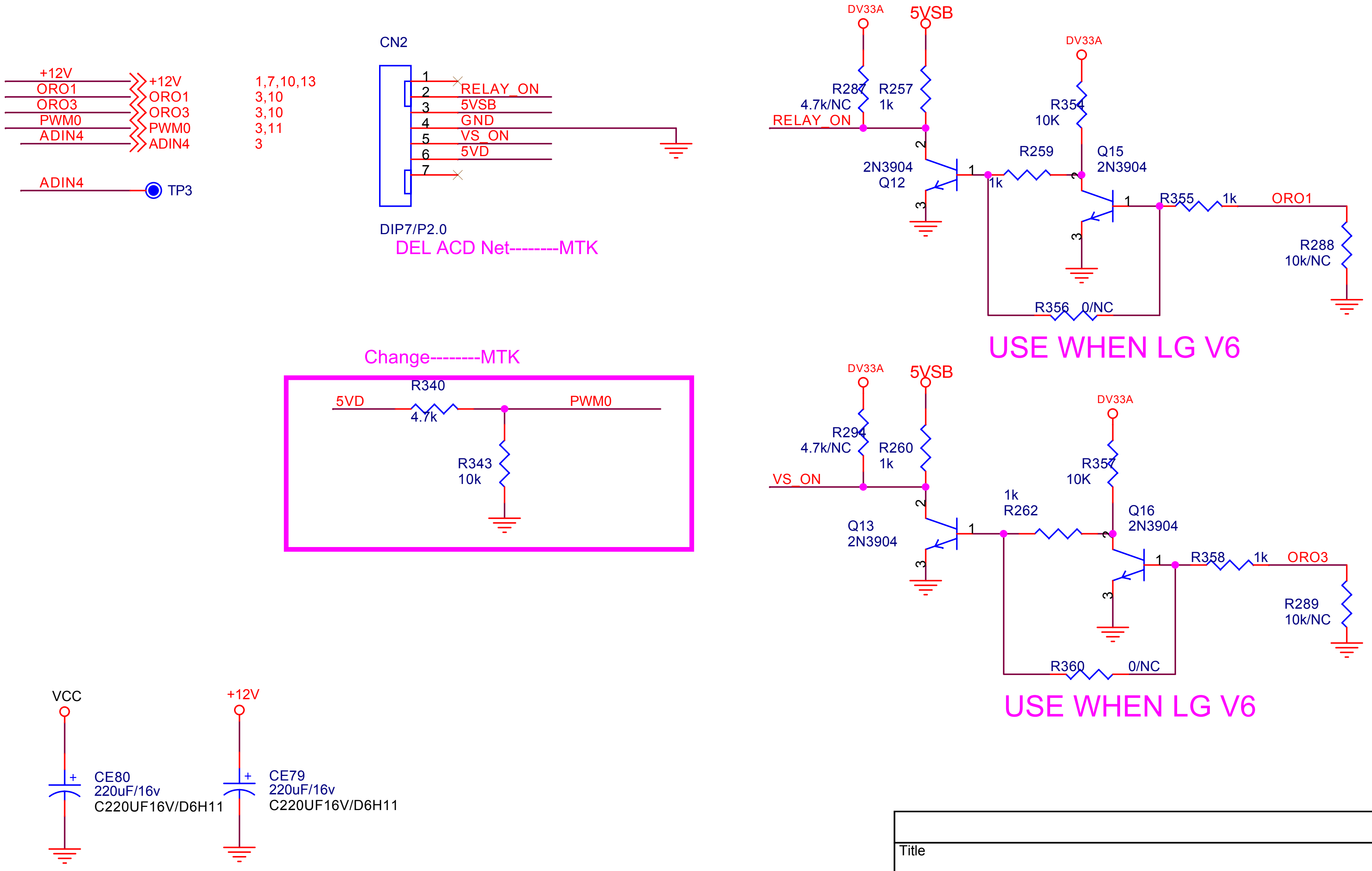


SW	Function
0	PC <---> MT5351 U0 MT5351 U2 <---> MT8205
1	PC <---> MT8205 PC -----> MT5351 U0RX

Title

Size	Doc Number	Rev
Custom	ATSC INTERFACE	V1.2

Date: Wednesday, October 12, 2005 Sheet 13 of 15



Title		
Size: A	Doc Number: PDP interface	Rev: V1.2
Date: Wednesday, October 12, 2005	Sheet 14 of 15	

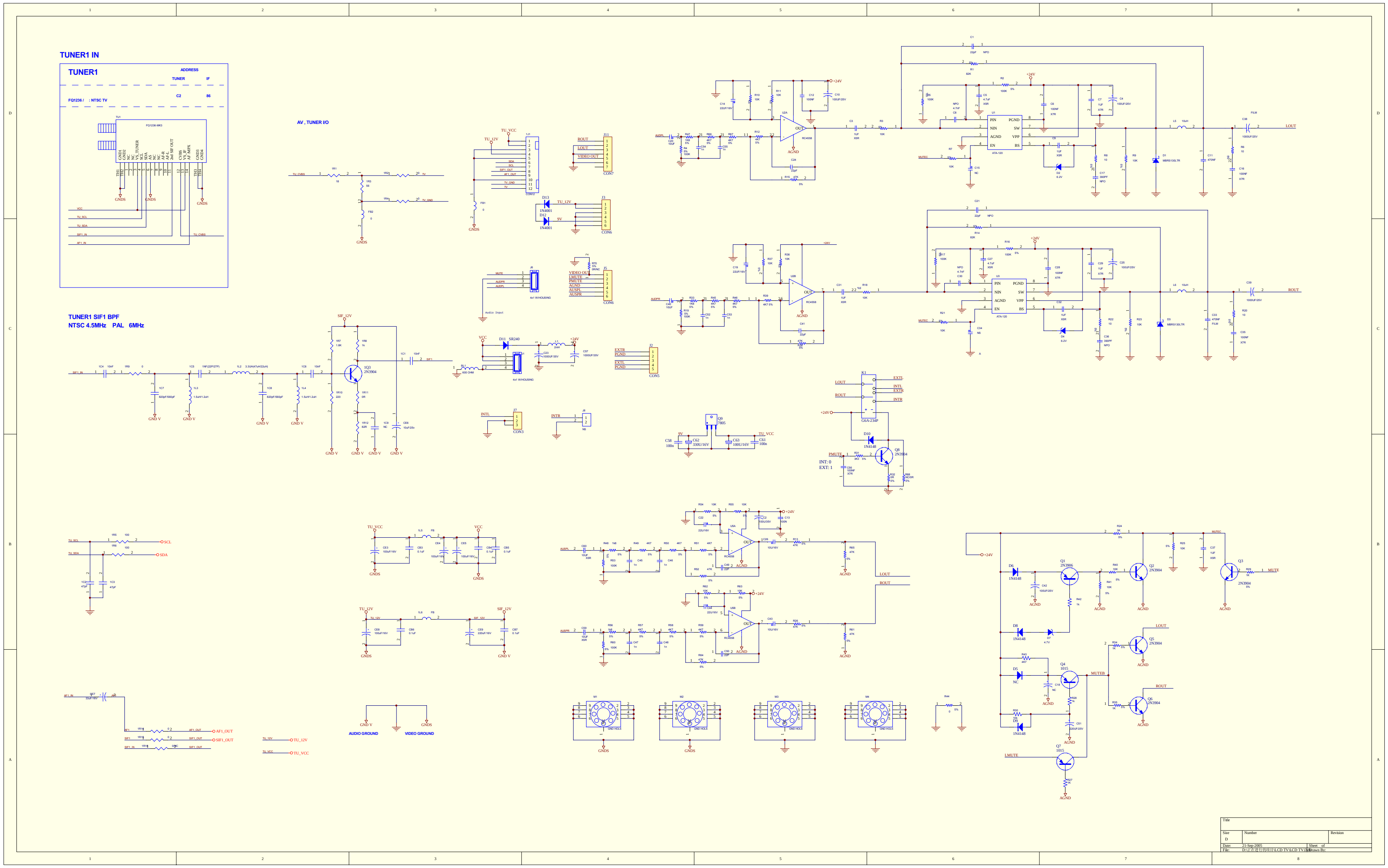
From V0.1 To V1.2 change item:

1,Add R109-10K;R107-4.7K;C135-56pF;0603-R88,R91,R104,R106-0欧姆.0805-R96,R99,R101-0欧姆

2,Reset IC 增加5V Supply;DVI AUDIO ADD CONNECTOR J8.

3,ADIN4 CHANGE TO PWM0

Title		
Size: A	Doc Number: History	Rev: V1.2
Date: Wednesday, October 12, 2005	Sheet 15 of 15	



TUNER1 IN
TUNER1
ADDRESS
TUNER
IF
FQ1236 / : NTSC TV
C2
86
AV , TUNER I/O
TUNER1 SIF1 BPF
NTSC 4.5MHz PAL 6MHz
AUDIO GROUND
VIDEO GROUND

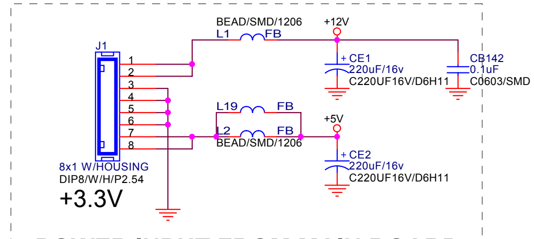
MT5351RA-V2

MT5111 / MT5351 REFERENCE DESIGN - 4 LAYERS

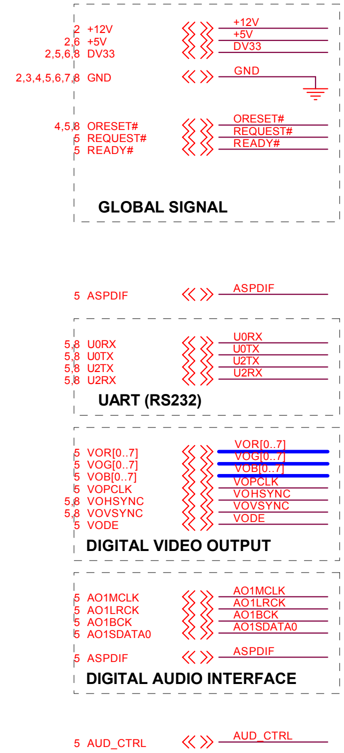
Rev	History	P#	DATE
RA-V1	INITIAL VERSION		2005/06/15
RA-V2	ADDED AUDIO SWITCH / REFINE POWER CIRCUIT		2005/07/14

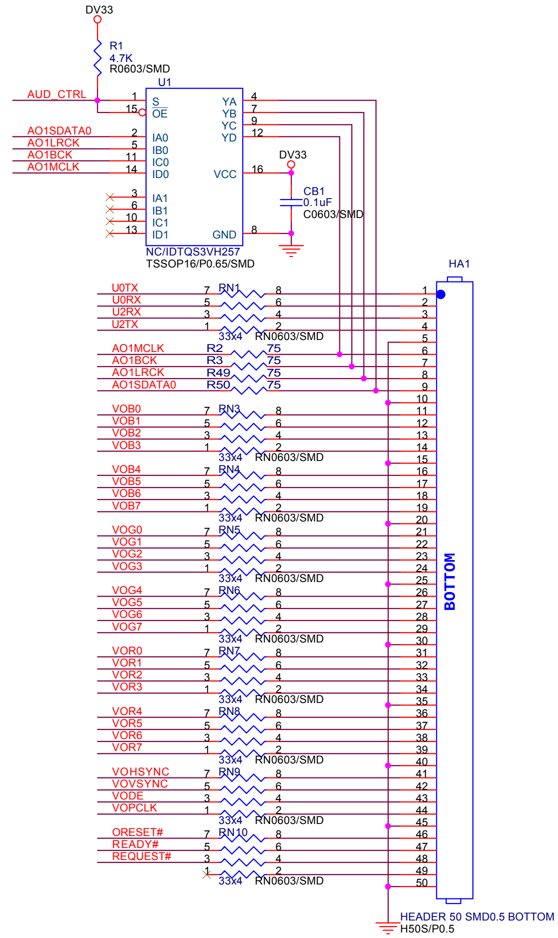
NS : NON-STUFF

NAME	TYPE	DEVICE
+12V	POWER +12V	POWER SUPPLY
+5V	POWER +5V	POWER SUPPLY
+5V_tuner	POWER +5V	TUNER POWER
DV33_DM	POWER +3V3	MT5111 POWER
DV18	POWER +1V8	MT5111 POWER
DV33	POWER +3V3	MT5351 POWER
AV33	POWER +3V3	MT5351 ANALOG POWER
DV25	POWER +2V5	MT5351 DDR POWER
DV12	POWER +1V2	MT5351 POWER
GND	GROUND	GROUND

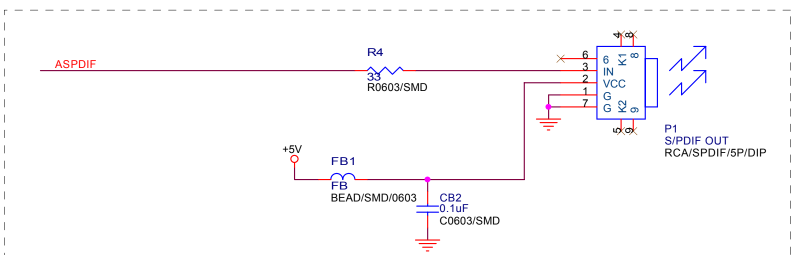


POWER INPUT FROM MAIN BOARD



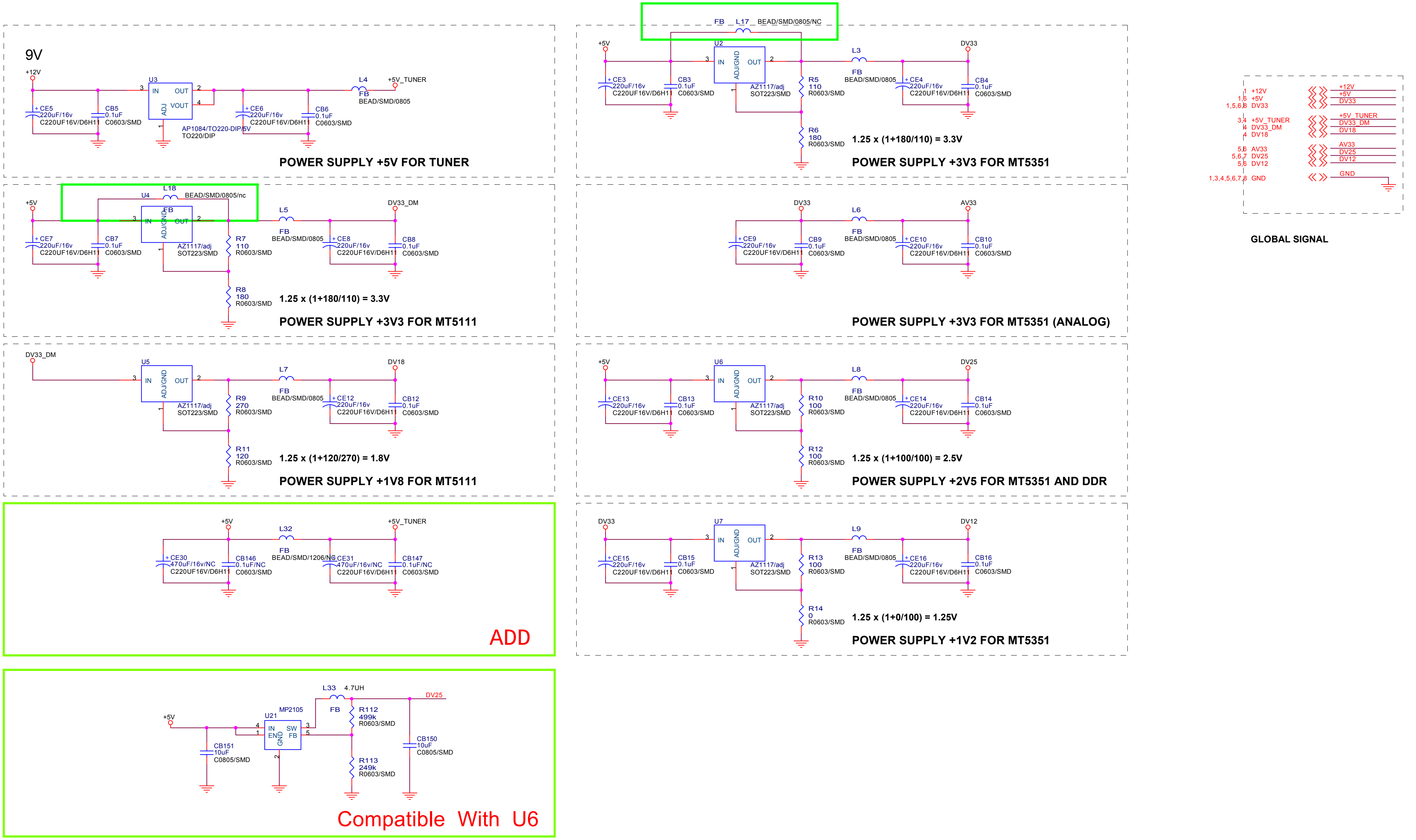


DIGITAL OUTPUT



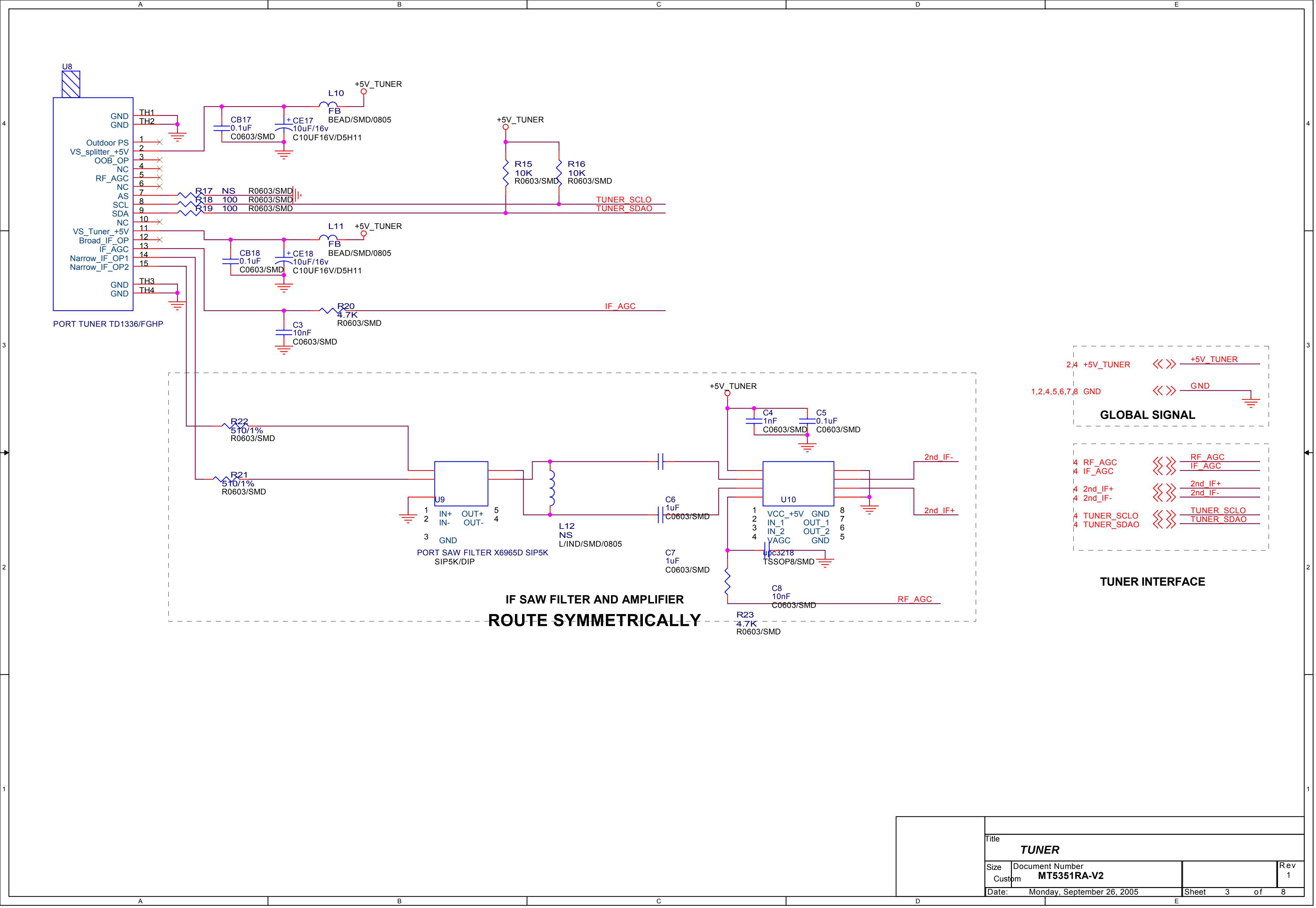
SPDIF CIRCUIT

Title POWER		
Size	Document Number	Rev
Date:	Sheet of	

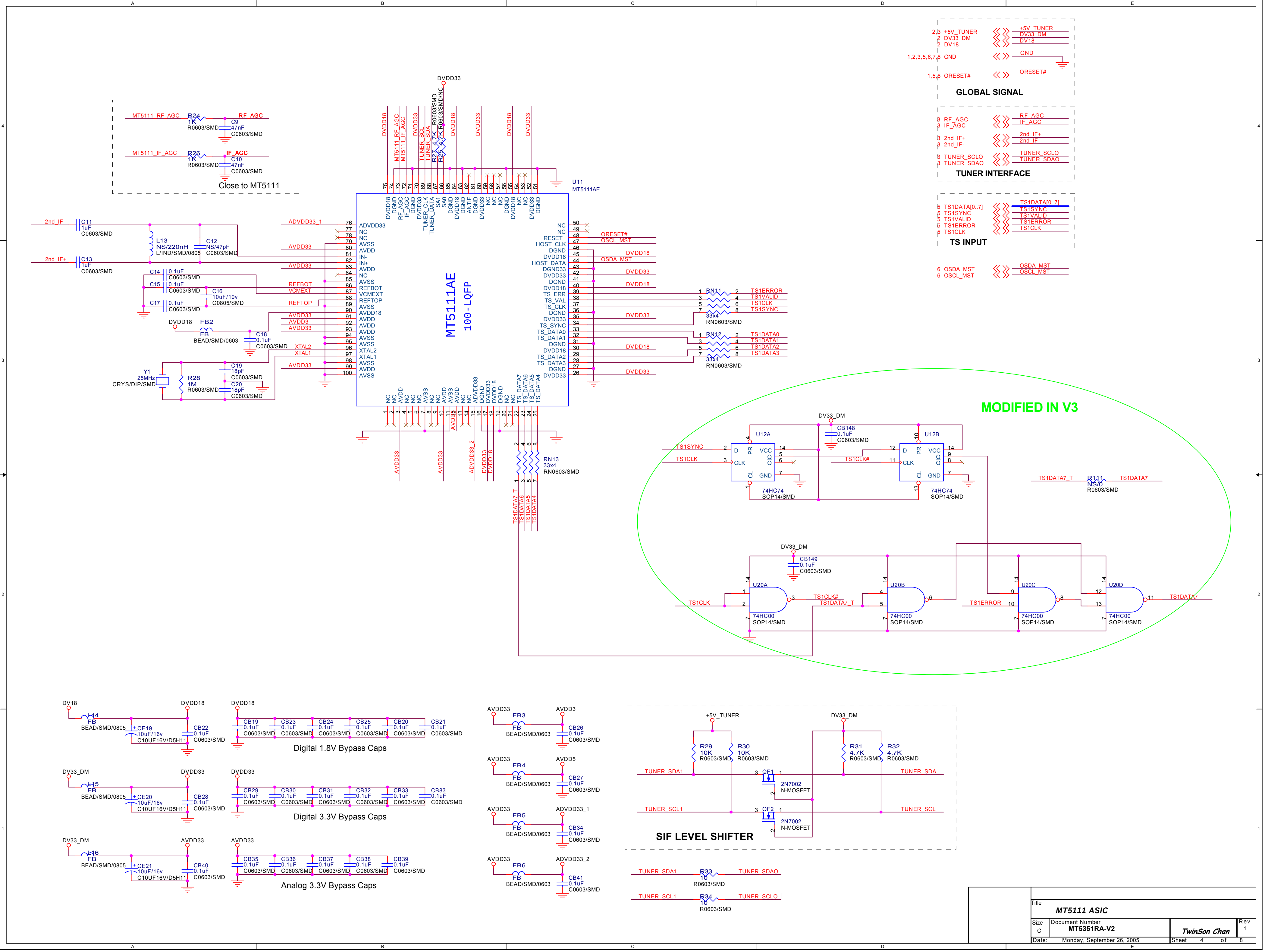


Title	POWER		
Size Custom	Document Number MT5351RA-V2		Rev 1
Date: Monday, September 26, 2005		Sheet 2 of 8	

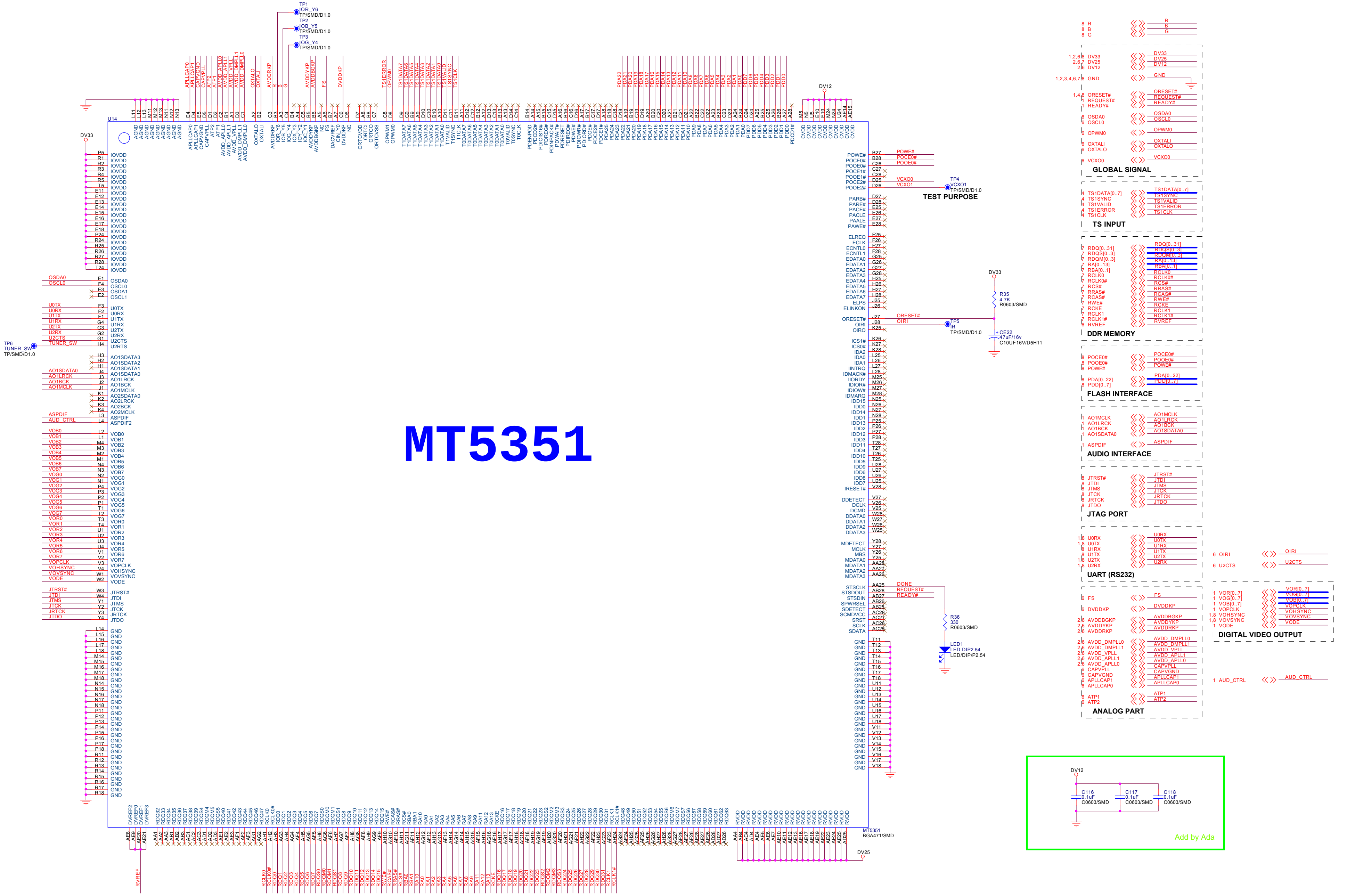
TwinSon Chan



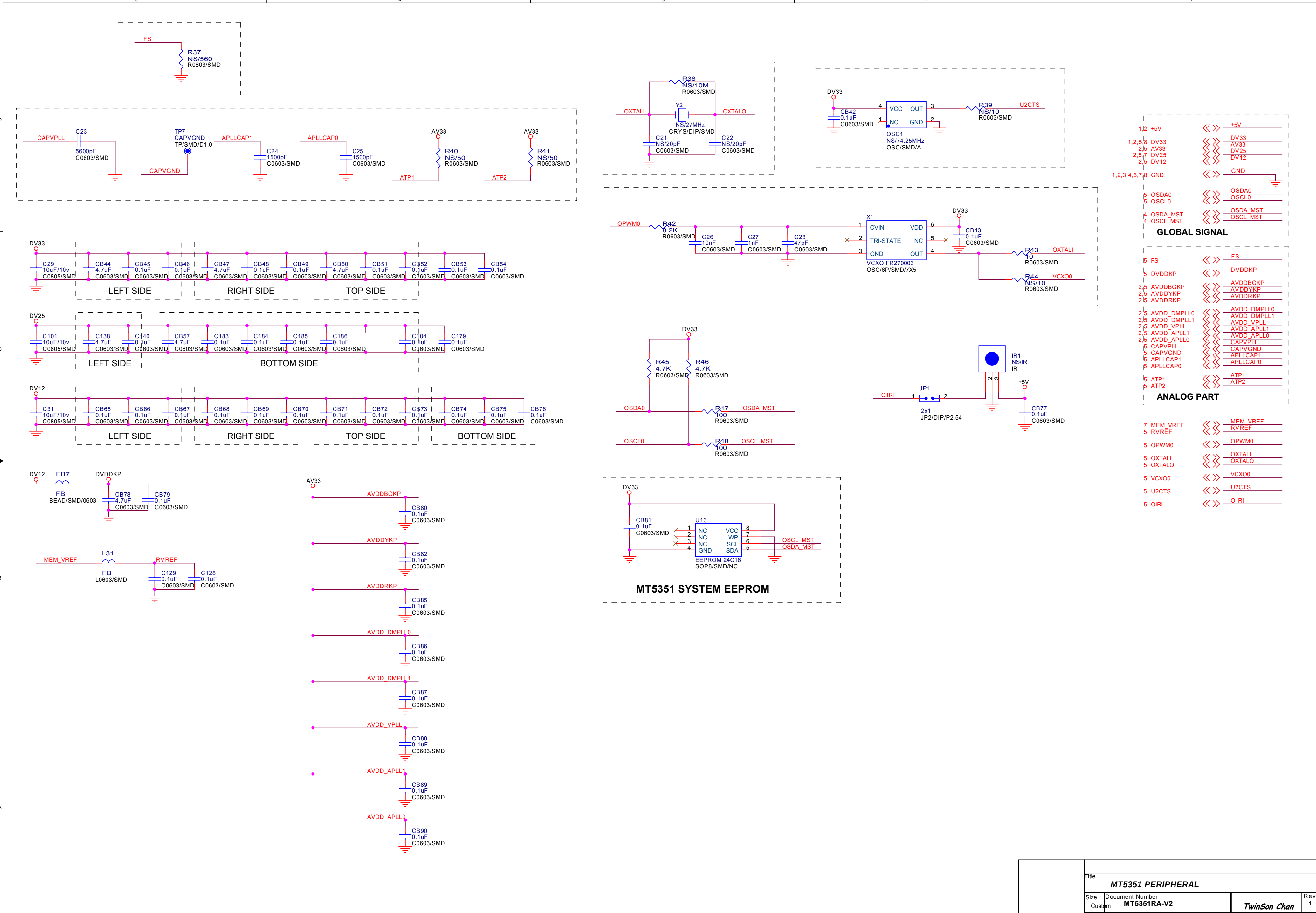
TwinSon Chan



GLOBAL SIGNAL
+5V_TUNER
DV33_DM
DV18
GND
ORESET#
TUNER INTERFACE
RF_AGC
IF_AGC
2nd_IF+
2nd_IF-
TUNER_SCLO
TUNER_SDAO
TS INPUT
TS1DATA[0..7]
TS1SYNC
TS1VALID
TS1ERROR
TS1CLK
OSDA_MST
OSCL_MST
Close to MT5111
MT5111_RF_AGC
MT5111_IF_AGC
U11
MT5111AE
100-LQFP
MODIFIED IN V3
U12A
U12B
74HC74
SOP14/SMD
U20A
U20B
U20C
U20D
74HC00
R111
NS/0
R0603/SMD
TS1DATA7_T
TS1DATA7
Digital 1.8V Bypass Caps
Digital 3.3V Bypass Caps
Analog 3.3V Bypass Caps
SIF LEVEL SHIFTER
TUNER_SDA1
TUNER_SCL1
TUNER_SDA
TUNER_SCL
2N7002
N-MOSFET
R33
R34
Title
MT5111 ASIC
Size
C
Document Number
MT5351RA-V2
Rev
1
TwinSon Chan
Date: Monday, September 26, 2005
Sheet 4 of 8



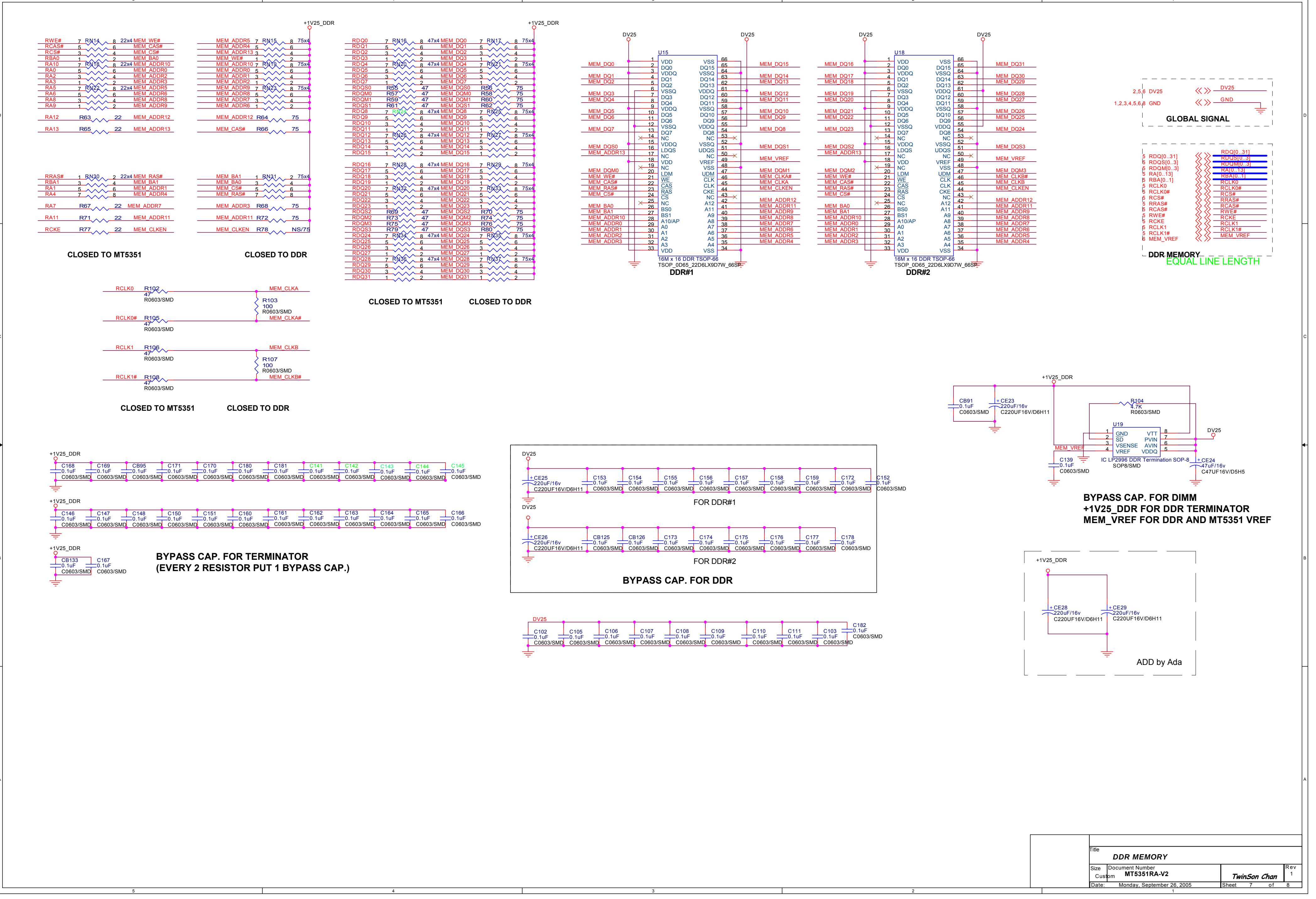
Title	MT5351 ASIC		
Size: Custom	Document Number: MT5351RA-V2	TwinSon Chan	Rev: 1
Date: Monday, September 26, 2005		Sheet 5 of 8	

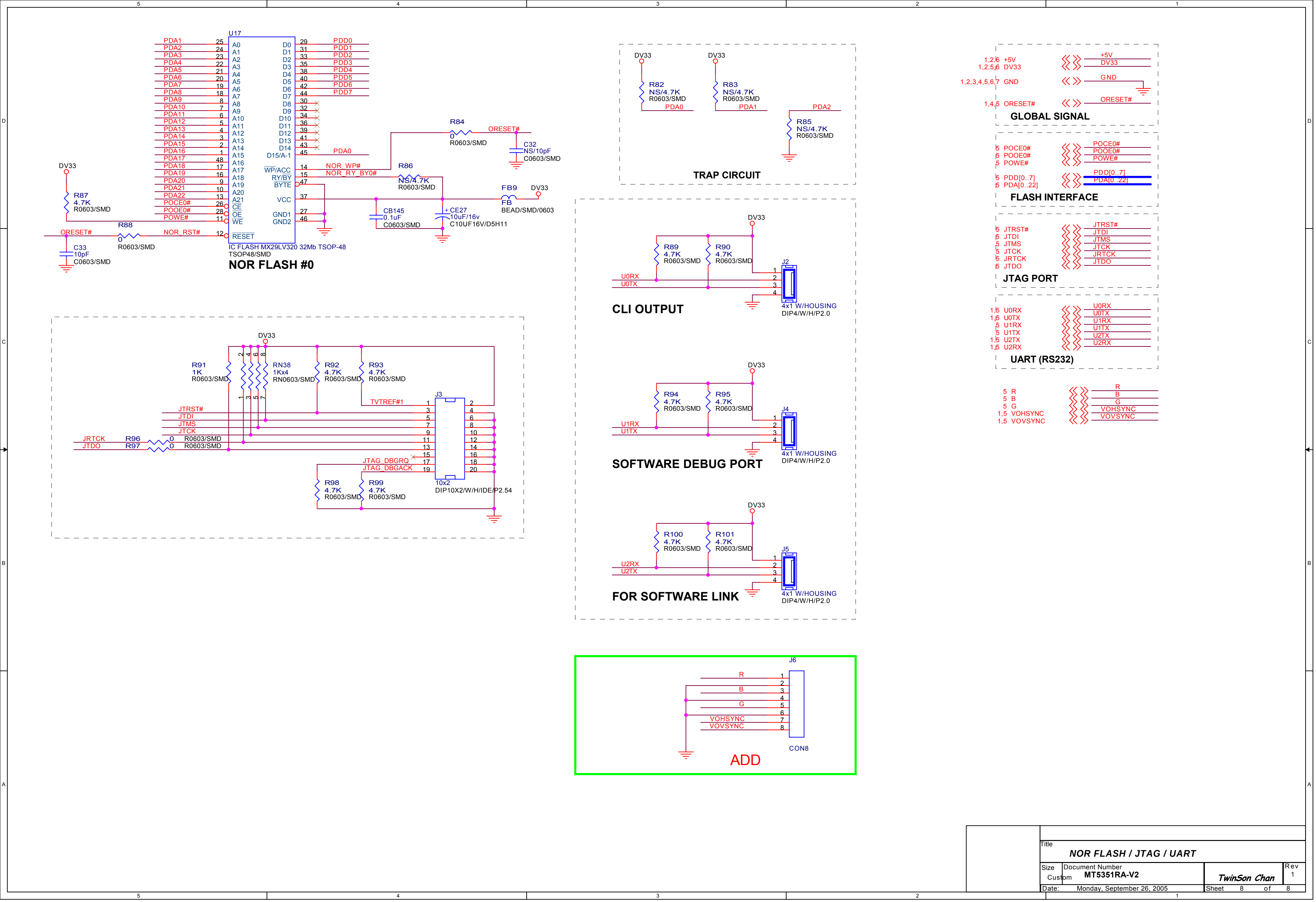


Title: MT5351 PERIPHERAL

Size: Custom | Document Number: MT5351RA-V2 | TwinSon Chan | Rev: 1

Date: Monday, September 26, 2005 | Sheet 6 of 8


CLOSED TO MT5351
CLOSED TO DDR
CLOSED TO MT5351
CLOSED TO DDR
CLOSED TO MT5351
CLOSED TO DDR
DDR#1
DDR#2
GLOBAL SIGNAL
DDR MEMORY
EQUAL LINE LENGTH
BYPASS CAP. FOR TERMINATOR
(EVERY 2 RESISTOR PUT 1 BYPASS CAP.)
FOR DDR#1
FOR DDR#2
BYPASS CAP. FOR DDR
BYPASS CAP. FOR DIMM
+1V25_DDR FOR DDR TERMINATOR
MEM_VREF FOR DDR AND MT5351 VREF
ADD by Ada
Title
DDR MEMORY
Size Custom
Document Number MT5351RA-V2
Rev 1
TwinSon Chan
Date: Monday, September 26, 2005
Sheet 7 of 8



U17
IC FLASH MX29LV320 32Mb TSOP-48
TSOP48/SMD
NOR FLASH #0
R84
0
R0603/SMD
ORESET#
C32
NS/10pF
C0603/SMD
NOR_WP#
NOR_RY_BY0#
R86
NS/4.7K
R0603/SMD
FB9
FB
BEAD/SMD/0603
DV33
CB145
0.1uF
C0603/SMD
CE27
10uF/16v
C10UF16V/D5H11
R87
4.7K
R0603/SMD
R88
0
R0603/SMD
NOR_RST#
C33
10pF
C0603/SMD
TRAP CIRCUIT
R82
NS/4.7K
R0603/SMD
PDA0
R83
NS/4.7K
R0603/SMD
PDA1
R85
NS/4.7K
R0603/SMD
PDA2
GLOBAL SIGNAL
+5V
GND
FLASH INTERFACE
POCE0#
POOE0#
POWE#
PDD[0..7]
PDA[0..22]
JTAG PORT
JTRST#
JTDI
JTMS
JTCK
JRTCK
JTDO
UART (RS232)
U0RX
U0TX
U1RX
U1TX
U2TX
U2RX
R
B
G
VOHSYNC
VOVSYNC
CLI OUTPUT
R89
4.7K
R0603/SMD
R90
4.7K
R0603/SMD
J2
4x1 W/HOUSING
DIP4/W/H/P2.0
SOFTWARE DEBUG PORT
R94
4.7K
R0603/SMD
R95
4.7K
R0603/SMD
J4
FOR SOFTWARE LINK
R100
4.7K
R0603/SMD
R101
4.7K
R0603/SMD
J5
R91
1K
R0603/SMD
RN38
1Kx4
RN0603/SMD
R92
4.7K
R0603/SMD
R93
4.7K
R0603/SMD
J3
TVTREF#1
JRTCK
JTDO
R96
R97
JTAG_DBGRQ
JTAG_DBGACK
R98
4.7K
R0603/SMD
R99
4.7K
R0603/SMD
10x2
DIP10X2/W/H/IDE/P2.54
J6
CON8
ADD
Title
NOR FLASH / JTAG / UART
Size
Custom
Document Number
MT5351RA-V2
TwinSon Chan
Rev
1
Date: Monday, September 26, 2005
Sheet 8 of 8

Basic Operations & Circuit Description

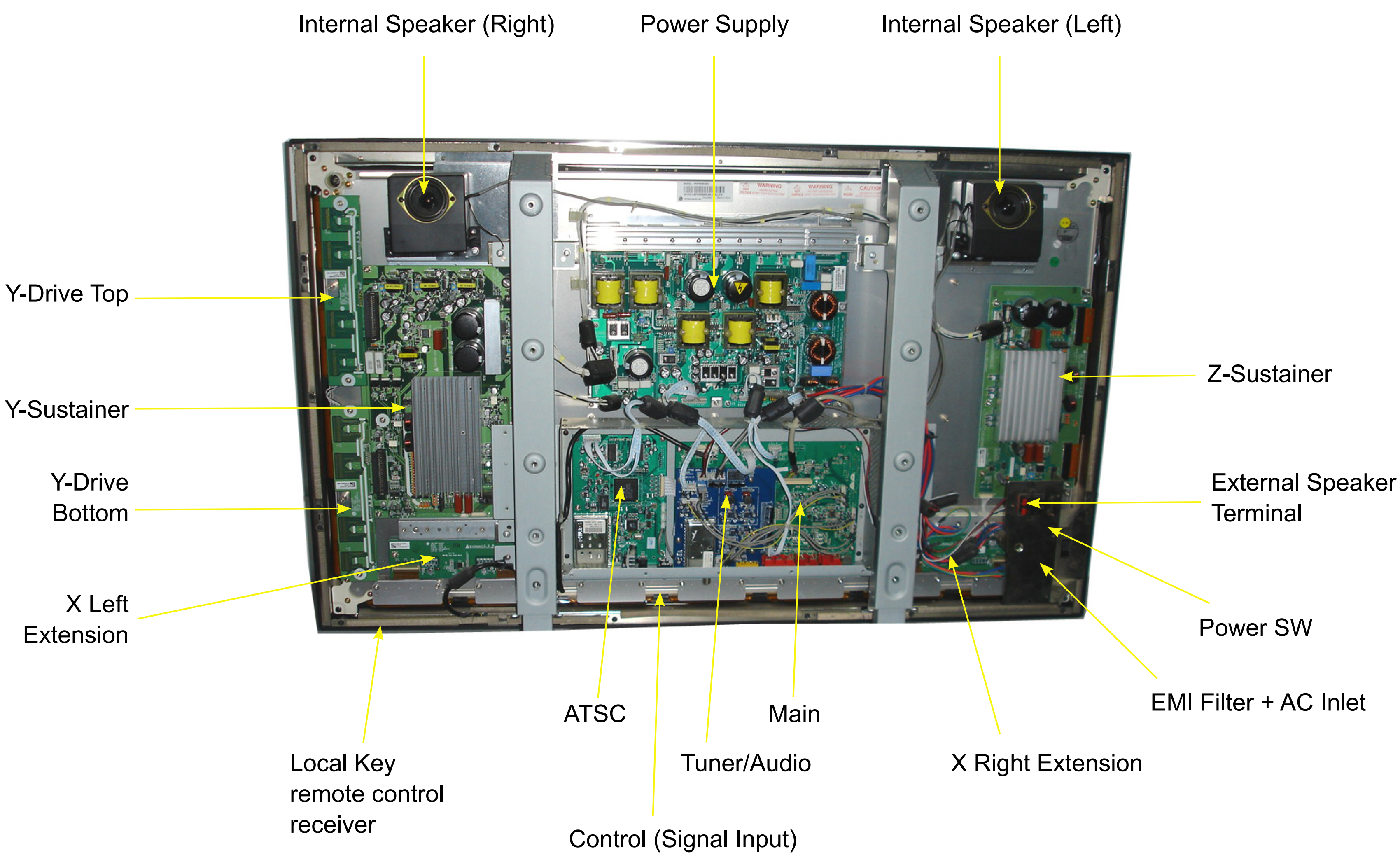
MODULE

There are 1 pcs panel and 8 pcs PCB including 2 pcs Y/Z Sustainer board, 2 pcs Y Drive board, 2 pcs X (left and right) Extension PCB, 1 pcs Control (Signal Input) and 1 pcs Power board in the Module.

SET

There are 6 pcs PCBs including 1 pcs Tuner/Audio board, 1 pcs Keypad board, 1 pcs Remote Control Receiver board, 1 pcs L/R Speakers and 1 pcs Main (Video) board, 1 pcs ATSC 1 pcs ATSC board in the SET.

Parts position



PCB function

1. Power:
   (1). Input voltage: AC 110V~240V, 47Hz~63Hz.
   Input range: AC 90V(Min)~265V(Max) auto regulation.
   (2). To provide power for PCBs.
2. Main board: To converter TV signals, S signals, AV signals, Y Pb/Cb Pr/Cr signals, DVI signals and D-SUB signals to digital ones and to transmit to Control board.
3. Control board: Dealing with the digital signal for output to panel.
4. Y-Sustainer / Z-Sustainer board:
   (1). Receiving the signals from Control and high voltage supply.
   (2). Output scanning waveform for Module.
5. Y-Drive board: Receive signal from Y sustainer, output horizontal scanning wave-form to the panel.
6. X (left and right) extension board: Output addressing signals.
7. Tuner/Audio Board：Amplifying the audio signal to the internal or external speakers of which selected.
   To convert TV RF signal to video and SIF audio signal to Main board.
8. ATSC Board: Receiver and converter ATSC TV signal to transmit to main board.

PCB failure analysis

1. CONTROL: a. Abnormal noise on screen. b. No picture.
2. MAIN : a. Lacking color, Bad color scale.
   b. No voice.
   c. No picture but with signals output, OSD and back light.
   d. Abnormal noise on screen.
3. POWER: No picture, no power output.
4. Z - Sustainer: a. No picture.
   b. Color not enough.
   c. Flash on screen.
5. Y - Sustainer: Darker picture with signals.

6. Tuner/Audio : a. No voice. (Make sure status: Mute / Internal, External speaker)
   b. Noise
   c. No ATV signals
7. Y/Z - Sustainer: The component working temperature is about 55°C.
   If the temperature rises abnormal, this may be a error point.

8. ATSC: a. No ATSC TV signal

Basic operation of Plasma Display

1. After turning on power switch, power board sends 5Vst-by Volt to Main IC MT8205 waiting for ON signals from Key Switch or Remote Receiver.

2. When the ON signal from Key Switch or Remote Receiver is detected, MT8205 will send ON Control signals to Power. Then Power sends (5Vsc, 9Vsc, 12Vsc, 24V and RLY ON, Vs ON) to PCBs working. This time VIF will send signals to display back light, OSD on the panel and start to search available signal sources. If the audio signals input, them will be amplified by Audio AMP and transmitted to Speakers.

3. If some abnormal signals are detected (for example: over volts, over current, over temperature and under volts), the system will be shut down by Power off.

Main IC Specifications

- MT8205
- SiI169
- M13S128168A
- MP7720

MEDIATEK

MT8205/8203

Application Notes

Specifications are subject to change without notice

History

2004/09/12	Runma Chen	for customer design-in	V1.0
2004/09/30	Dragon Chen	Add feature list	V1.1
2004/09/30	Runma Chen	Modify for PIP/POP 444 support	V1.2
2004/10/01	Runma Chen	PIP/POP hardware limitation-I	V1.3
2004/10/18	Dragon Chen & Wen Hsu	PIP/POP hardware limitation-II & video front end component	V1.4
2004/10/20	Dragon Chen	Update functional block	V1.5
2004/10/21	Dragon Chen	Correct function block fault to V1.4	V1.6
2004/11/04	Dragon Chen	1. Delete power spec. (About power spec, please reference another document) 2. Add AC & DC characteristics 3. Add pin description 4. Add audio out mapping rule	V1.7
2004/11/05	Dragon Chen	Descript more detail for pin power initial state & remove some description to another document (MT8205 product brief)	V1.8

MT8205/8203 Application Notes

MT8205/8203 is a highly integrated single chip for LCD TV supporting video input and output format up to HDTV. It includes 3D comb filter TV Decoder to retrieve the best image from popular composite signals. On-chip advanced motion adaptive de-interlacer converts accordingly the interlace video into progressive one with overlay of a 2D Graphic processor. Optional 2nd HDTV or SDTV inputs allows user to see multi-programs on same screen. Flexible scalar provides wide adoption to various LCD panel for different video sources. Its on-chip audio processor decodes analog signals from Tuner with lip sync control, delivering high quality post-processed sound effect to customers. On-chip microprocessor reduces the system BOM and shortens the schedule of UI design by high level C program. MT8205/8203 is a cost-effective and high performance HDTV-ready solution to TV manufactures.

FEATURES

- Video Input

  Input Multiplexing:
  - Without external switch, it supports
  - 1x Component,
  - 1x S-video,
  - 1x VGA/Component, (dual function ports)
  - 1x Digital and
  - 3x Composite inputs
  - All the input sources can be flexibly routed to Main/PIP internally

  Input Formats:
  - Support VGA input up to SXGA (1280x1024@60Hz) including SOG VGA
  - Support HDTV 480p/720p/1080i input
  - Support DVI 24-bit RGB digital input
  - Support CCIR-656/601 digital input

- TV decoder

  For PIP/POP:
  - Dual identical TVD on chip (Single on MT8203)
  - 3D-Comb for both path.
  - Dual VBI decoders for the application of V-Chip

  Supporting formats:
  - Support PAL (B,G,D,H,M,N,I,Nc), PAL(Nc), PAL, NTSC, NTSC-4.43, SECAM
  - Automatic Luma/Chroma gain control
  - Automatic TV standard detection
  - NTSC/PAL Motion Adaptive 3D comb filter
  - Motion Adaptive 3D Noise Reduction
  - VBI decoder for Closed-Caption/XDS/ Teletext/WSS/VPS
  - Macrovision detection

- 2D-Graphic/OSD processor
  - Two OSD planes. (For example, Teletext and V-Chip will occupy one planes)
  - Support alpha blending among these two planes and video
  - Support Text/Bitmap decoder
  - Support line/rectangle/gradient fill
  - Support bitblt
  - Support color Key function
  - Support Clip Mask
  - 65535/256/16/4/2-color bitmap format OSD,
  - Automatic vertical scrolling of OSD image
  - Support OSD mirror and upside down

- Host Micro controller
  - Turbo 8032 micro controller
  - Built-in internal 373 and 8-bit programmable lower address port
  - 2048-bytes on-chip RAM
  - Up to 4M bytes FLASH-programming interface
  - Supports 5/3.3-Volt. FLASH interface
  - Supports power-down mode
  - Supports additional serial interface
  - IR control serial input
  - Support RS232 interface
  - Support single interface directly supporting SD/MS/MMC memory card
  - Support 2 PWM output
  - Support DDC2Bi/DDC2B/DDC1/DDCCI
  - Maximum 48 programmable GPIO pins
  - DRAM Controller
  - Supports up to 32M-byte SDR/DDR DRAM
  - Supports 16 bit DDR or 32 bit SDR/DDR bus interface
  - Build in a DRAM interface programmable clock to optimize the DRAM performance
  - Programmable DRAM access cycle and refresh cycle timings
  - Maximum DRAM clock rate is 166MHz
  - Support 3.3/2.5-Volt SDR/DDR Interface

- Video Processor

  Color Management
  - Flesh tone and multiple-color enhancement. (For skin, sky, and grass…)
  - Gamma/anti-Gamma correction
  - Color Transient Improvement (CTI)
  - Saturation/hue adjustment

  Contrast/Brightness/Sharpness Management
  - Sharpness and DLTI/DCTI
  - Brightness and contrast adjustment
  - Black level extender
  - White peak level limiter
  - Adaptive Luma/Chroma management

  De-interlacing
  - Automatic detect film or video source

- 3:2/2:2 pull down source detection
- Advanced Motion adaptive de-interlacing

Scaling

- Arbitrary ratio vertical/horizontal scaling of video, from 1/32X to 32X
- Advanced linear and non-linear Panorama scaling.
- Programmable Zoom viewer
- Picture-in-Picture (PIP)
- Picture-Out-Picture (POP)

Display

- 12/10, 10/8, 8/6 Dithering processing for LCD display
- 10bit gamma correction
- Support Alpha blending for Video and two OSD planes
- Frame rate conversion

Audio Input/Output

- 2 path TV audio in.
- Support AF/SIF decode from Tuner.
- 2 channel audio L/R digital line in.
- Total support 12 channel digital outputs optional for general stereo, 2.1 channel with subwoofer, 5.1 channel, and headphone out.

Audio Features

- Support BTSC/EIAJ/A2/NICAM decode
- Stereo demodulation, SAP demodulation
- Mode selection (Main/SAP/Stereo)
- Equalizer
- Sub-woofer/Bass enhancement
- MTK proprietary 3D surround processing (Virtual surround)
- Audio and video lip synchronization
- Support Reverberation

JPEG Decoder

- Decode base-line/progressive JPEG file thru memory card i/f
- SD/MS/MMC, Maximum 1000 files (depend on DRAM size), FW is not finished yet. (10/E will be ready)

Video Output

- 480i/576i/480p/576p/720p/1080i
- Up to (1280x1024@75Hz) (1366x768@60Hz)
- Dual-channel 6/8-bit LVDS/TTL output
- Support video output mirror and upside down

DRAM Usage

- For features of 8205, 2pcs of 8x16 DDR166 is necessary
- For features of 8203, 2/1pcs of 8x16 DDR (limited PIP/POP features)
- Here is a comparison chart between (2xDDR) and (1xDDR)

	DDR*1(16Mb)	DDR*2(32Mb)
NR	Y	Y
3D-Comb	Y	Y
MDDi	480i/576i	1080i
PIP	*Y	Y
POP	*Y	Y
Display	1024x768	1920x1080

- For 1080i input, 8203 only support bob mode de-interlacing.
- With single DDR, we could support very limited PIP/POP mode.

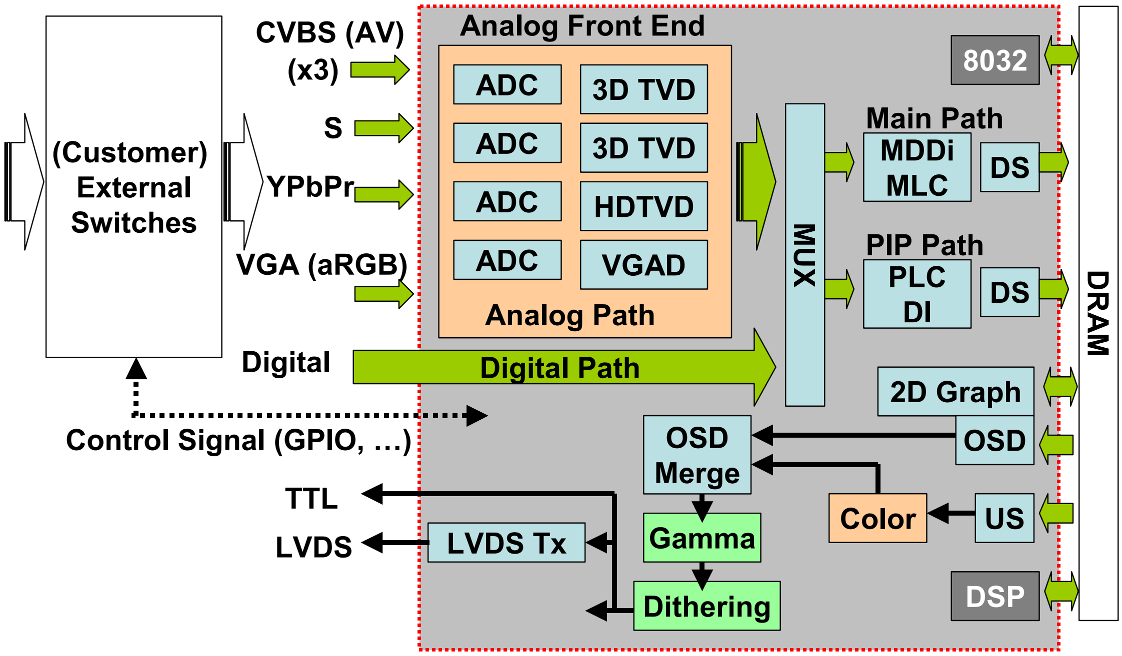
Flash Usage

- Flash is used to store FW code, fonts, bitmaps, big tables for VGA, Video, Gamma..
- In our demo system, we can support 2-4 languages within 1MB flash.
- For single country, we need around 20KB to store font data.
- For more bitmaps, we need more flash space to store them.
- 2Mbytes is recommended to build a general TV model.

Outline

- 388-pin BGA package
- 3.3/1.8-Volt. Dual operating voltages
- 0.18um UMC process

BLOCK DIAGRAM



Silicon Image

PanelLink®
Technology

SiI 169
HDCP PanelLink Receiver

Data Sheet

Document # SiI-DS-0049-B

Silicon Image, Inc.

SiI-DS-0049-B
August 2002

Application Information
To obtain the most updated Application Notes and other useful information for your design, contact your local Silicon Image sales office. Please also visit the Silicon Image web site at www.siliconimage.com.

Copyright Notice

Trademark Acknowledgment

Disclaimer

Revision History

Revision	Date	Comment
A	07/18/2002	Release to Production with complete parametric information.
B	08/14/2002	Correction to DDC bus voltage level-shifting diagram; add Pb-free part number.

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General Description

The SiI 169 Receiver uses PanelLink Digital technology to support HDTV and high-resolution digital displays for DTV and PC applications. It features High-bandwidth Digital Content Protection (HDCP) for secure delivery of high-definition video in consumer electronics products.

The SiI 169 comes with integrated, pre-programmed HDCP keys, greatly simplifying manufacturing and providing the highest level of security. For improved ease of use, the SiI 169 has enhanced jitter tolerance and a low-power standby mode.

PanelLink Digital technology is the world's leading DVI solution, providing a digital interface solution that is easy to implement and cost-effective. PanelLink further simplifies the display interface design by resolving many of the system level issues associated with high-speed mixed signal circuits.

Features

- Integrated 25-165MHz PanelLink core to support VGA to UXGA resolutions
- Supports HDTV resolutions (720p/1080i)
- Integrated HDCP decryption engine for viewing protected content
- Pre-programmed HDCP keys provide highest level of key security, simplify manufacturing
- Enhanced jitter tolerance
- Time staggered data output for reduced ground bounce
- High Skew Tolerance: 1 full input clock cycle (6ns at 165MHz)
- Backwards compatible with SiI 161B
- Sync Detect for "Hot Plugging"
- Flexible low power modes with automatic power down when input clock is inactive
- Low power 3.3V core operation
- Compliant with DVI 1.0
- Standard and Pb-free packages (see page 38).

SiI 169 Pin Diagram

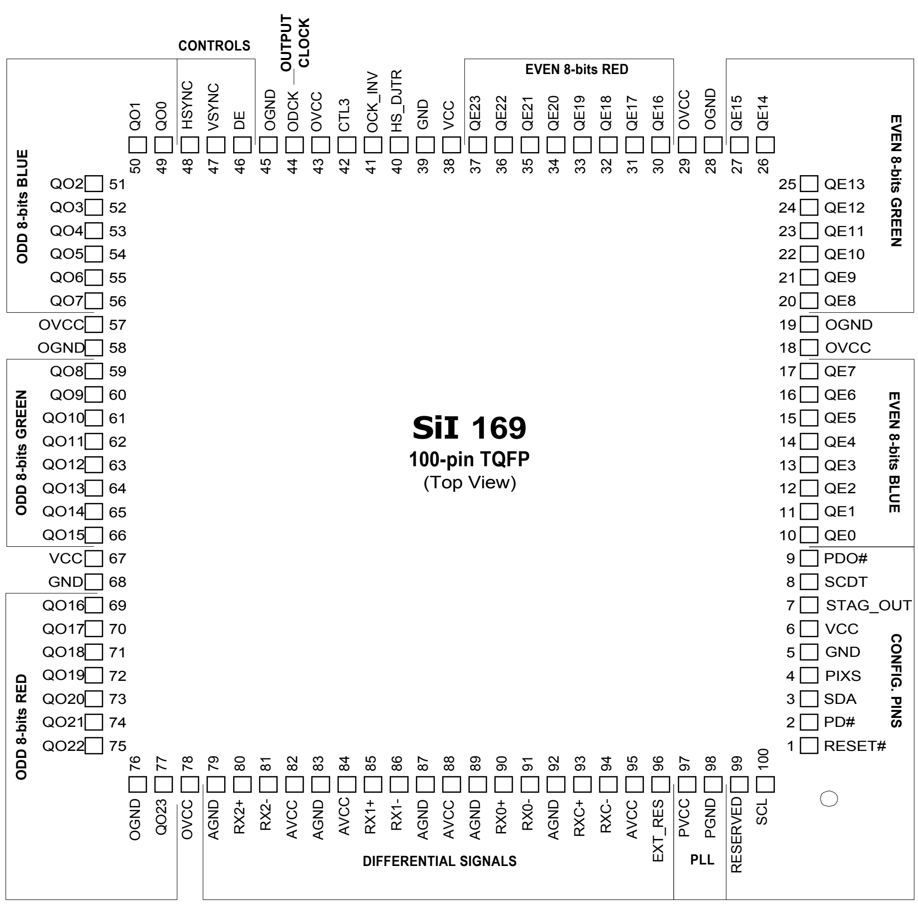


Figure 1. SiI 169 Pin Diagram

Functional Description

The SiI 169 is a DVI 1.0 compliant digital-output receiver with built-in High-bandwidth Digital Content Protection (HDCP). It provides a simple, cost effective solution for DTVs implementing DVI-HDCP. Pre-programmed HDCP keys simplify manufacturing while providing the highest level of security. There is no need to use encrypted keys, program EEPROMs, or cure epoxy coating.

Figure 2 shows the functional blocks of the chip.

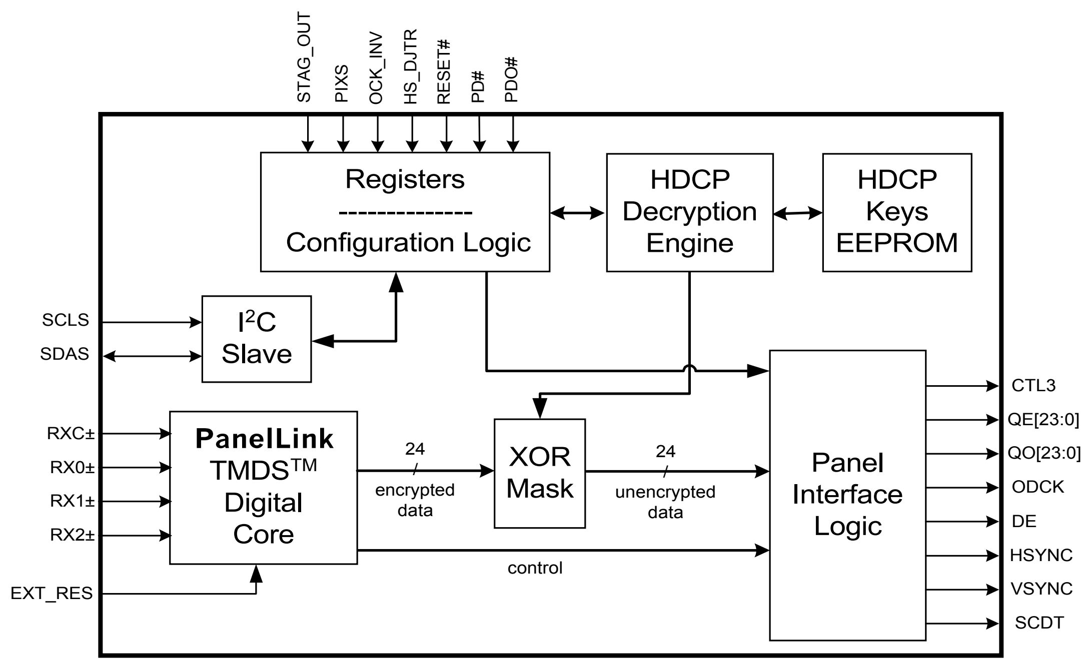


Figure 2. Functional Block Diagram

PanelLink TMDS Core

The PanelLink TMDS core accepts as inputs the three TMDS differential data lines and the differential clock. The core senses the signals on the link and properly decodes them providing accurate pixel data. The core outputs the necessary sync signals (HSYNC, VSYNC), clock (ODCK), and a display enable (DE) signal that drives high when video pixel data is present. The SCDT signal is output when there is active video on the DVI link and the PLL has locked on to the video. SCDT can be used to trigger external circuitry, indicating that an active video signal is present; or used to place the device outputs in power down when no signal is present (by tying SCDT to PDO#). A resistor tied to the EXT_RES pin is used for impedance matching.

I^2C Interface and Registers

The SiI 169 uses a slave I^2C interface, capable of running at 400kHz, for communication with the host. HDCP authentication is managed by reading and writing to registers through the I^2C interface. This bus, called DDC in the DVI specification, is also tied to the EDID EEPROM that contains information about the display's capabilities (resolution, aspect ratio, etc.). The I^2C address of the SiI 169 is 74h as specified by HDCP. This interface is not 5V tolerant and it is recommended that a voltage level shifter be used between the SiI 169 and the DVI connector as the DDC bus is specified to support 5V signaling.

HDCP Decryption Engine and XOR Mask

The HDCP decryption engine contains all the necessary logic to decrypt an incoming video signal on a pixel-by-pixel basis. The host system microcontroller initiates an authentication sequence with the receiver to initialize the SiI 169 HDCP decryption engine. Upon successful completion of the authentication process, the SiI 169 is ready to decrypt the incoming video via the XOR mask.

Encrypted and unencrypted video will be sent at different times. Therefore the host HDCP transmitter uses the CTL3 signal to indicate to the SiI 169 receiver whether the incoming video is encrypted or not.

HDCP Keys EEPROM

The SiI 169 comes pre-programmed with a production set of HDCP keys in its internal EEPROM. In this way the keys are provided the highest level of protection as required by the HDCP specification. Silicon Image manages all aspects of the key purchasing and programming. There is no need for the customer to purchase HDCP keys from the licensing authority. For security reasons, the keys cannot be read out of the device.

Samples of the SiI 169 are available with the B1 public keys as listed in the back of the HDCP specification. These are marked with a -PUB part number as noted in the Ordering Information section. Make sure to request either “Public” or “Production” keys when requesting samples. Before receiving samples of the SiI 169 with production keys a customer must have signed the HDCP license agreement.

Panel Interface Logic and Configuration Logic

Unencrypted video data is sent to the display logic by way of a 48-bit output interface. The functionality of this interface is affected by several of the externally strapped configuration logic options as follows.

- The data output can be presented in either one pixel per clock or two pixels per clock format, depending on the PIXS configuration setting.
- The polarity of the output clock ODCK can be inverted to accommodate both rising- and falling-edge clocking through the OCK_INV configuration setting.
- Using the STAG_OUT configuration setting, the odd and even data output groups can be staggered in time to reduce EMI.
- The HS_DJTR configuration setting can compensate for host-side jitter on the HSYNC input to the transmitter.
- The PD# and PDO# inputs select chip power down modes and allow for disabling of the outputs to the panel.

The RESET# input must be in the HIGH state during normal operation, in both HDCP and non-HDCP modes. Its primary purpose is to reset the digital block circuitries, including the HDCP engine, and registers at initial chip power-up time. The VSYNC, HSYNC, DE, and CTL3 signals will be driven low while RESET# is asserted. If it is necessary to disable the HDCP engine while leaving the chip fully operational for reception of unencrypted video, use the software reset feature located at bit 0 of register 0xFF by setting it to “1”.

Revision History

Revision 0.1 (15 Jan. 2002)

- Original

Revision 0.2 (19 Nov. 2002)

-changed ordering information & DC/AC characteristics

Revision 0.1	Revision 0.2
M13S128168A - 5T	M13S128168A - 6T
M13S128168A - 6T	M13S128168A - 7.5AB

Revision 0.3 (8 Aug. 2003)

-Change IDD6 from 3mA to 5mA.

Revision 0.4 (27 Aug. 2003)

-Change ordering information & DC / AC characteristics.

Revision 1.0 (21 Oct. 2003)

-Modify tWTR from 2tck to 1tck.

Revision 1.1 (10 Nov. 2003)

-Correct some refresh interval that is not revised.

-Correct some CAS Lantency that is not revised.

Revision 1.2 (12 Jan. 2004)

-Correct IDD1; IDD4R and IDD4W test condition.

-Correct tRCD; tRP unit

-Add tCCD spec.

-Add tDAL spec.

Revision 1.3 (12 Mar. 2004)

-Add Cas Latency=2; 2.5

DDR SDRAM

2M x 16 Bit x 4 Banks
Double Data Rate SDRAM

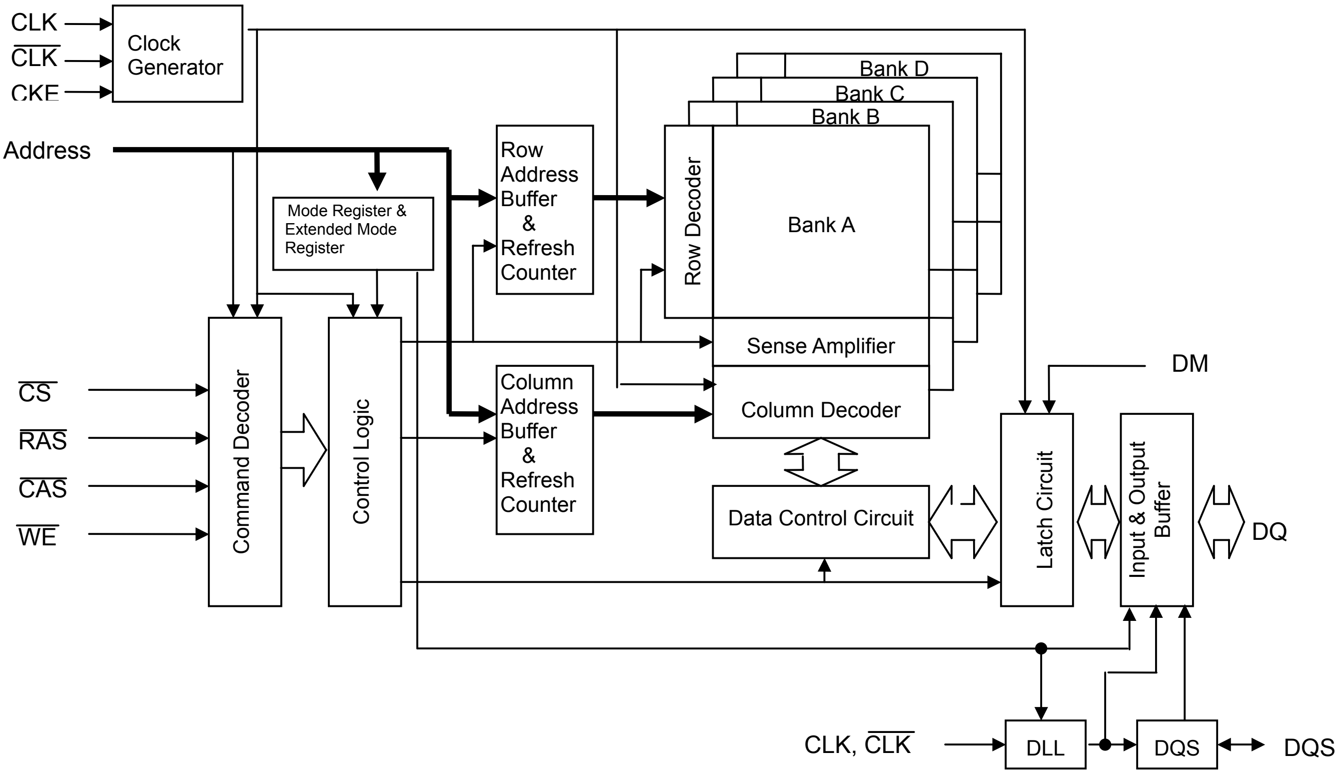
Features

- JEDEC Standard
- Internal pipelined double-data-rate architecture, two data access per clock cycle
- Bi-directional data strobe (DQS)
- On-chip DLL
- Differential clock inputs (CLK and $\overline{CLK}$)
- DLL aligns DQ and DQS transition with CLK transition
- Quad bank operation
- CAS Latency : 2; 2.5; 3
- Burst Type : Sequential and Interleave
- Burst Length : 2, 4, 8
- All inputs except data & DM are sampled at the rising edge of the system clock(CLK)
- Data I/O transitions on both edges of data strobe (DQS)
- DQS is edge-aligned with data for reads; center-aligned with data for WRITE
- Data mask (DM) for write masking only
- V_{DD} = 2.375V ~ 2.75V, V_{DDQ} = 2.375V ~ 2.75V
- Auto & Self refresh
- 7.8us refresh interval
- SSTL-2 I/O interface
- 66pin TSOPII package

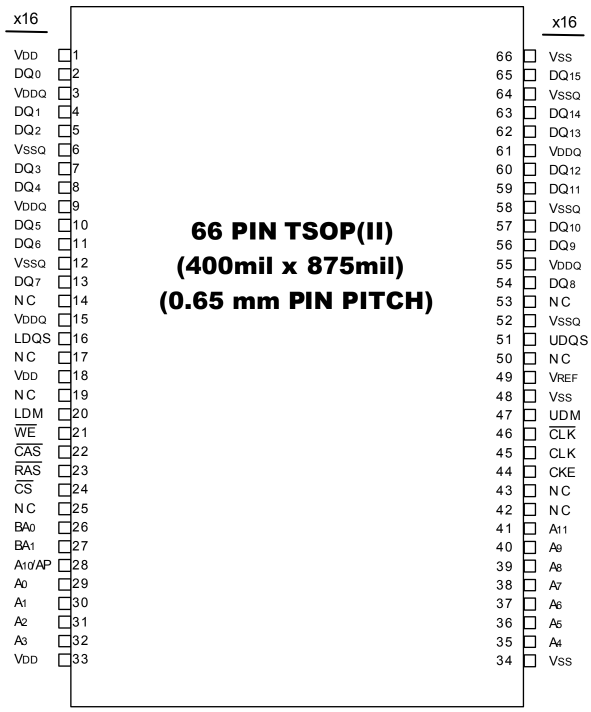
Operating Frequencies :

PRODUCT NO.	MAX FREQ	VDD	PACKAGE
M13S128168A -5T	200MHz	2.5V	TSOPII
M13S128168A -6T	166MHz		

Functional Block Diagram



Pin Arrangement



MP7720

20W Class D Mono Single Ended Audio Amplifier

Monolithic Power Systems

PRELIMINARY INFORMATION

General Description

The MP7720 is a mono 20W Class-D Audio Amplifier. It is one of MPS' second generation of fully integrated audio amplifiers which dramatically reduces solution size by integrating the following:

- **180mΩ power MOSFETs**
- **Start up / shut down pop elimination**
- **Short circuit protection circuits**
- **Mute / Stand By**

The MP7720 utilizes a single ended output structure capable of delivering 20W into 4Ω speakers. MPS Class-D Audio Amplifiers exhibit the high fidelity of a Class A/B amplifier at efficiencies greater than 90%. The circuit is based on the MPS' proprietary variable frequency topology that delivers excellent PSRR, fast response time and operates on a single power supply.

Features

- 20W output at V_{DD}=24V into a 4Ω load
- THD+N = 0.04% @ 1W, 8Ω
- 93% efficiency at 20W
- Low noise (190µV typical)
- Switching Frequency to 1MHz
- 9.5V to 24V operation from single supply
- Integrated Start Up and Shut Down Pop Elimination Circuit
- Thermal protection
- Integrated 180mΩ switches
- Mute / Standby-mode (Sleep)
- Tiny 8 Pin SOIC or PDIP Package
- Evaluation Board Available

Applications

- Surround Sound DVD Systems
- Televisions
- Flat Panel Monitors
- Multimedia computers
- Home stereo

Ordering Information

Part Number ∗	Package	Temperature
MP7720DS	SOIC8	-40°C to + 85°C
MP7720DP	PDIP8	-40°C to + 85°C
EV0030	Evaluation Board	

∗ For Tape & Reel use suffix - Z (e.g. MP7720DS-Z)

∗ For Lead Free use suffix - LF (e.g. MP7720DS-LF)

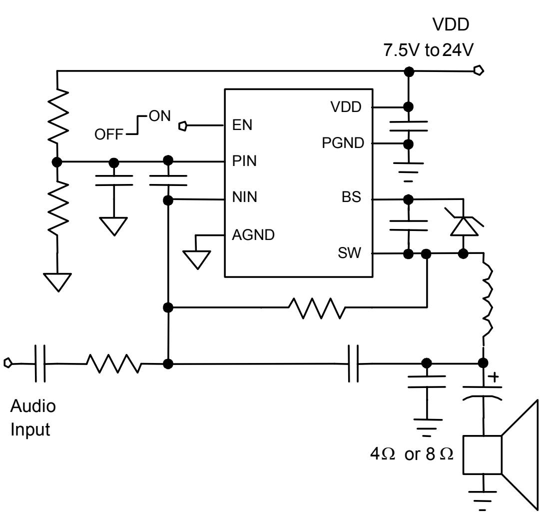


Figure 1: Typical Application Circuit

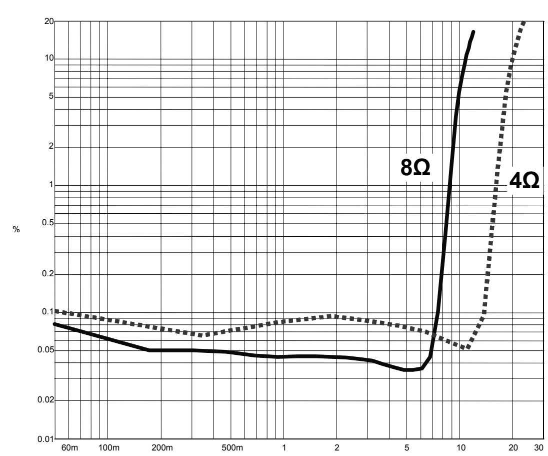


Figure 2: THD+N vs. Power (24V, 1KHz)

Absolute Maximum Ratings (Note 1)

Supply Voltage V_{DD}	26V
BS Voltage	V_{SW}-0.3V to V_{SW}+6.5V
Enable Voltage V_{EN}	-0.3V to 6V
V_{SW}, V_{PIN}, V_{NIN}	-1V to V_{DD}+1V
AGND to PGND	-0.3V to 0.3V
Junction Temperature	150°C
Lead Temperature	260°C
Storage Temperature	-65°C to 150°C

Recommended Operating Conditions (Note 2)

Supply Voltage V_{DD}	9.5V to 24V
Operating Temperature T_A	-40°C to 85°C

Package Thermal Characteristics

Thermal Resistance Θ_{JA} (SOIC8)	105°C/W
Thermal Resistance Θ_{JC} (SOIC8)	50°C/W
Thermal Resistance Θ_{JA} (PDIP8)	95°C/W
Thermal Resistance Θ_{JC} (PDIP8)	55°C/W

Table 1: Electrical Characteristics (V_{DD}=24V, V_{EN}=5V, T_A=25°C)

Parameters	Condition		Typ	Max	Units
Supply Current					
Standby Current	V_{EN} = 0V		1	5	µA
Quiescent Current			1.5	3.0	mA
Output Drivers					
SW On Resistance	Sourcing and Sinking		0.18		Ω
Short Circuit Current	Sourcing and Sinking		5.0		A
Inputs					
PIN, NIN Input Common Mode Voltage Range		0	$\frac{V_{DD}}{2}$	V_{DD}-1.5	V
PIN, NIN Input Current	V_{PIN}=V_{NIN}=12V		1	5	µA
EN Enable Threshold Voltage	V_{EN} Rising		1.4	2.0	V
	V_{EN} Falling	0.4	1.2		V
EN Enable Input Current	V_{EN} = 5V		1		µA
Thermal Shutdown					
Thermal Shutdown Trip Point	T_J Rising		150		°C
Thermal Shutdown Hysteresis			30		°C

Table 2: Operating Specifications (Circuit of Figure 3, V_{DD}=24V, V_{EN}=5V, T_A=25°C)

Standby Current	V_{EN} = 0V		130		µA
Quiescent Current			13		mA
Power Output	f=1KHz, THD+N = 10% , 4Ω Load		20		W
	f=1KHz, THD+N = 10% , 8Ω Load		10		W
THD+ Noise	P_{OUT}=1W, f=1KHz, 4Ω Load		0.08		%
	P_{OUT}=1W, f=1KHz, 8Ω Load		0.04		%
Efficiency	f =1KHz, P_{OUT}=1W, 4Ω Load		90		%
	f =1KHz, P_{OUT}=1W, 8Ω Load		95		%
Maximum Power Bandwidth			20		KHz
Dynamic Range			93		dB
Noise Floor	A-Weighted		190		µV
Power Supply Rejection	f=1KHz		60		dB

Note 1. Exceeding these ratings may damage the device.
Note 2. The device is not guaranteed to function outside its operating rating.

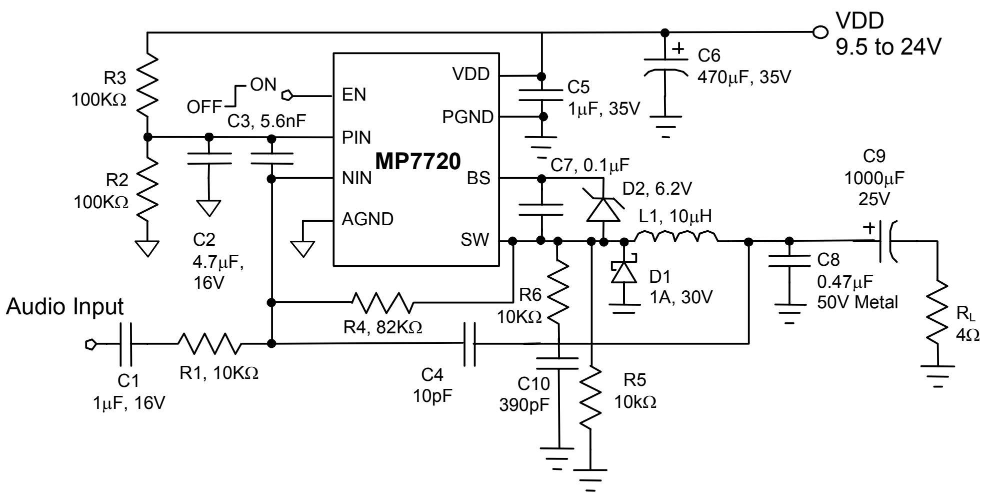


Figure 3: 20W Mono Typical Application Circuit

0. Warnings and Cautions

✓ WARNING indicates hazards that may lead to death or injury if ignored.
✓ CAUTION indicates hazards that may lead to injury or damage to property if ignored.

WARNING

1) This product uses a high voltage (450 V max.). Do not touch the circuitry of this product with your hands when power is supplied to the product or immediately after turning off the power. Be sure to confirm that the voltage is dropped to a sufficiently low level.

2) Do not supply a voltage higher than that specified to this product. This may damage the product and may cause a fire.

3) Do not use this product in locations where the humidity is extremely high, where it may be splashed with water, or where flammable materials surround it. Do not install or use the product in a location that does no satisfy the specified environmental conditions. This may damage the product and may cause a fire.

4) If a foreign substance (such as water, metal, or liquid) gets inside the product, immediately turn off the power. Continuing to use the products it may cause fire or electric shock.

5) If the product emits smoke, an abnormal smell, or makes an abnormal sound, immediately turn off the power. If noting is displayed or if the display goes out during use, immediately turn off the power. Continuing to use the product as it is may cause fire or electric shock.

6) Do not disconnect or connect the connector while power to the product is on. It takes some time for the voltage to drop to a sufficiently low level after the power has been turned off. Confirm that the voltage has dropped to a safe level before disconnecting or connecting the connector. Otherwise, this may cause fire, electric shock, or malfunction.

7) Do not pull out or insert the power cable from/to an outlet with wet hands. It may cause electric shock.

8) Do not damage or modify the power cable. It may cause fire or electric shock.

9) If the power cable is damaged, or if the connector is loose, do not use the product; otherwise, this can lead to fire or electric shock.

10) If the power connector or the connector of the power cable becomes dirty or dusty, wipe it with a dry cloth. Otherwise, this can lead to fire.

❑ USE

1) Because this product uses a high voltage, connecting or disconnecting the connectors while power is supplied to the product may cause malfunctioning. Never connect or disconnect the connectors while the power is on. Immediately after power has been turned off, a residual voltage remains in the product. Be sure to confirm that the voltage has dropped to a sufficiently low level.

2) Watching the display for a long time can tire the eyes. Take a break at appropriate intervals.

3) PDP 's brightness and contrast ratio is lower than that of the CRT. The picture is dimmer with surrounding light and better for viewing in dark condition.

4) Do not cover or wrap the product with a cloth or other covering while power is supplied to the product.

5) Before turning on power to the product, check the wiring of the product and confirm that the supply voltage is within the rated voltage range. If the wiring is wrong or if a voltage outside the rated range is applied, the product may malfunction or be damaged.

6) Do not store this product in a location where temperature and humidity are high. This may cause the product to malfunction. Because this product uses a discharge phenomenon, it may take time to light (operation may be delayed) when the product is used after it has been stored for a long time. In this case, it is recommended to light all cells for about 2hours (aging).

7) If the glass surface of the display becomes dirty, wipe it with a soft cloth moistened with a neutral detergent. Do not use acidic or alkaline liquids, or organic solvents.

8) Do not tilt or turn upside down while the module package is carried, the product may be damaged.

9) This product is made from various materials such as glass, metal, and plastic. When discarding it, be sure to contact a professional waste disposal operator.

❑ Repair and Maintenance

Because this product combines the display panel and driver circuits in a single module, it cannot be repaired or maintained at user's office or plant. Arrangements for maintenance and repair will be determined later

1. GENERAL DESCRIPTION

❑ DESCRIPTION

The PDP42V6#### is a 42-inch 16:9 color plasma display module with resolution of 852(H) × 480(V) pixels.
This is the display device which offers vivid colors with adopting AC plasma technology by LG Electronics Inc.

❑ FEARURES

High peak brightness (1000cd/m^2 Typical) and high contrast ratio (3000:1 Typical) enables user to create high performance PDP SETs.

❑ APPLICATIONS

- ✓ Public information display
- ✓ Video conference systems
- ✓ Education and training systems



❑ ELECTRICAL INTERFACE OF PLASMA DISPLAY

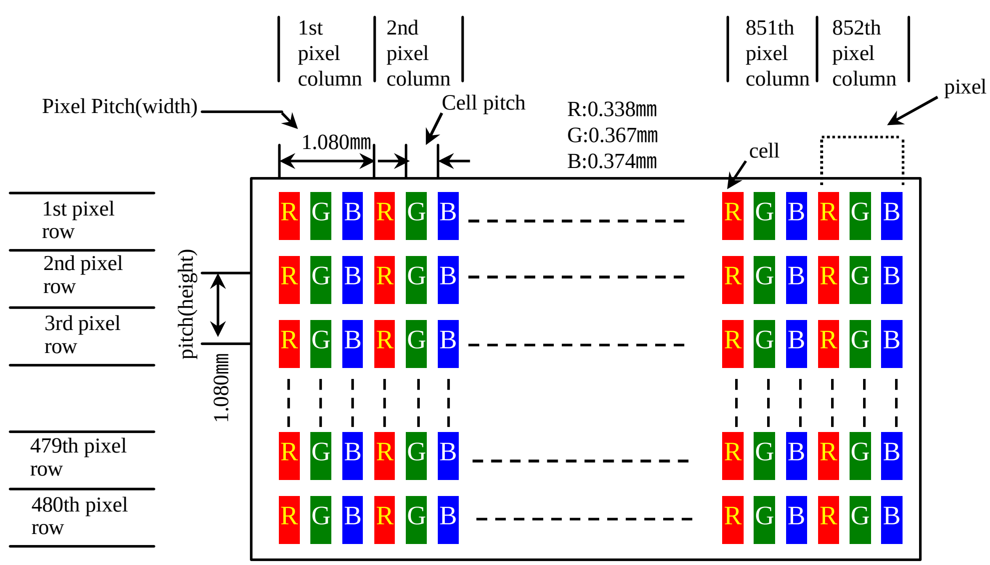
The PDP42V6#### requires only 8bits of digital video signals for each RGB color.
In addition to the video signals, six different DC voltages are required to operate the display.
The PDP42V6#### is equipped with P-CUBE function which analyzes display signals to optimize system control factor for showing the best display performance.

❑ GENERAL SPECFICATIONS

- ✓ Model Name : PDP42V6#### (42V6#### Model)
- ✓ Number of Pixels : 852(H) × 480(V) (1pixel=3 RGB cells)
- ✓ Pixel Pitch : 1080µm (H) × 1080µm (V)
- ✓ Cell Pitch : 367µm (H) × 1080µm (V) (Green Cell basis)
- ✓ Display Area : 920.1(H) × 518.4(V) ±0.5mm
- ✓ Outline Dimension : 1005(H) × 597(V) × 61(D)±1mm
- ✓ Pixel Type : RGB Closed type
- ✓ Number of Gradations : (R)256 × (G)256 × (B)256 (16.7 Mega colors)
- ✓ Weight : 14.8 Kg ± 0.5 Kg (Net 1EA)
  111 Kg ± 5 Kg (5EA/1BOX)
- ✓ Aspect Ratio : 16:9
- ✓ Peak Brightness : Typical 1000cd/㎡ (1/25 White Window)
- ✓ Contrast Ratio : Average 60:1 (In a bright room with 150Lux at center)
  : Typical 3000:1 (In a dark room 1/25 White Window pattern at center)
- ✓ Power Consumption : Typical 220 W (Full White)
- ✓ Life-time : more than 60,000 Hours of continuous operation

☞ Life-time is defined as the time when the brightness level becomes half of its initial value.

✓ Display Dot Diagram

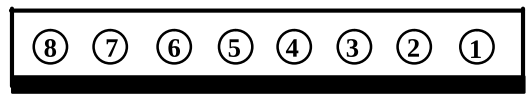


7. CONNECTORS and CONNECTIONS

❑ Power Input Connector

➢ Connector P3001 Pin Assignment

Pin No.	Symbol	Pin No.	Symbol
1	Vs	5	GND
2	Vs	6	Va
3	nc	7	GND
4	GND	8	+5V



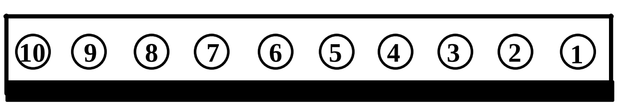
1-1123723-8 Pin numbers
(Top View, viewed from the pin connection side)

- ✓ Module side connector : 1-1123723-8 (Header)
- ✓ Mating Connector : 1-1123722-8 (Housing)
- ✓ Connector Supplier : AMP

➢ Connector P2005 Pin Assignment

Pin No.	Symbol	Pin No.	Symbol
1	VS	6	GND
2	VS	7	GND
3	VS	8	GND
4	nc	9	nc
5	GND	10	nc

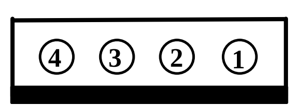
- ✓ Module side connector : 1-1123723-10 (Header)
- ✓ Mating Connector : 1-1123722 –10 (Housing)
- ✓ Connector Supplier : AMP



1-1123723-10 Pin numbers
(Top View, viewed from the pin connection side)

➢ Connector P2006 Pin Assignment

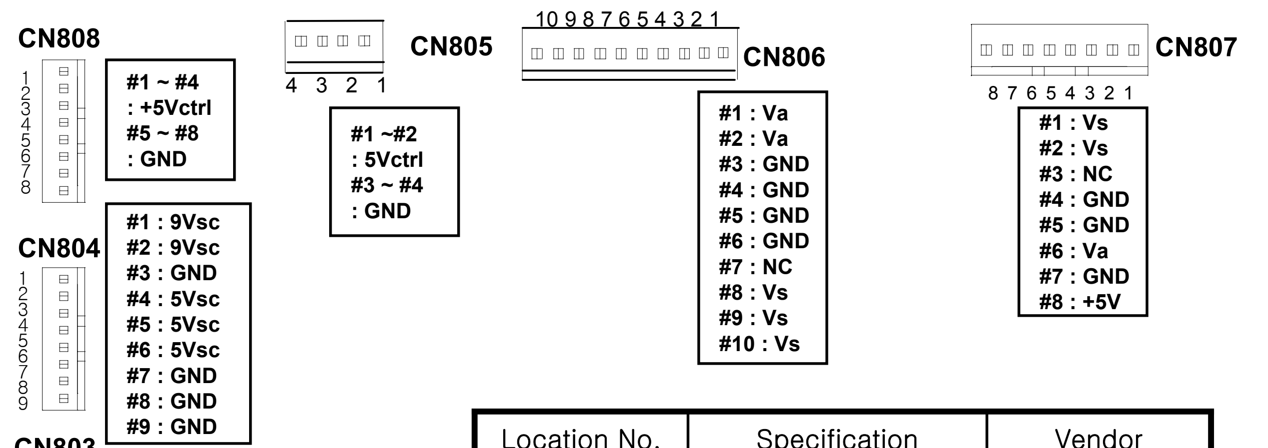
Pin No.	Symbol	Pin No.	Symbol
1	GND	3	5V
2	GND	4	5V

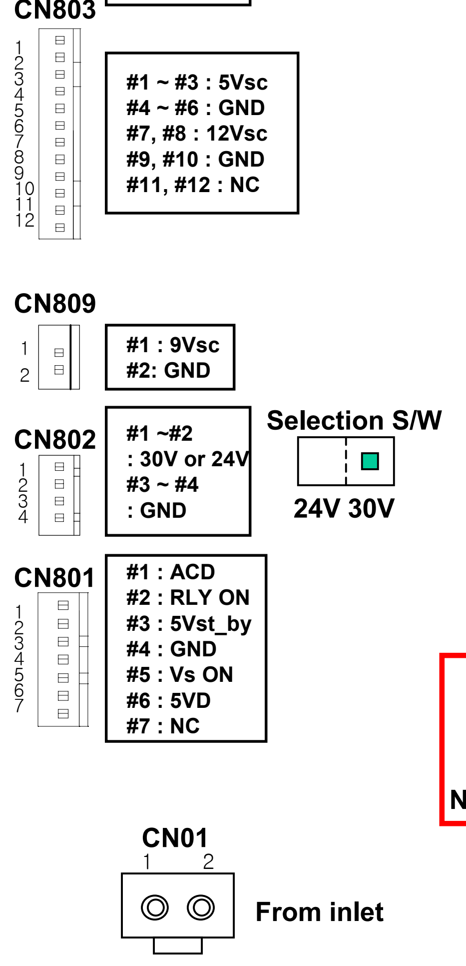


1-1123723-4 Pin numbers
(Top View, viewed from the pin connection side)

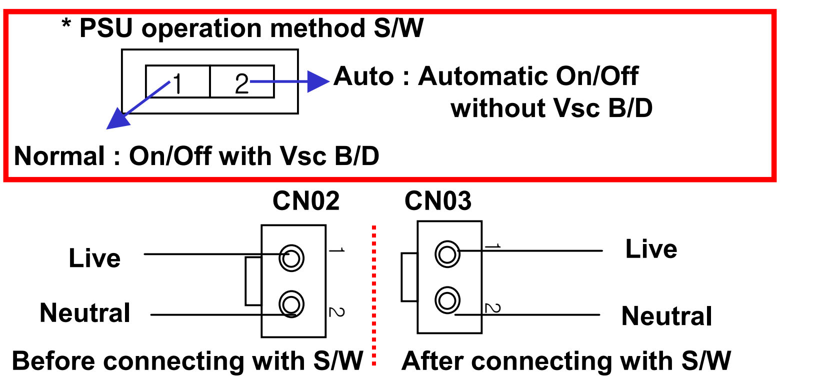
- ✓ Module side connector : 1-1123723-4 (Header)
- ✓ Mating Connector : 1-1123722-4 (Housing)
- ✓ Connector Supplier : AMP

8. Input/Output pin assignment & specification

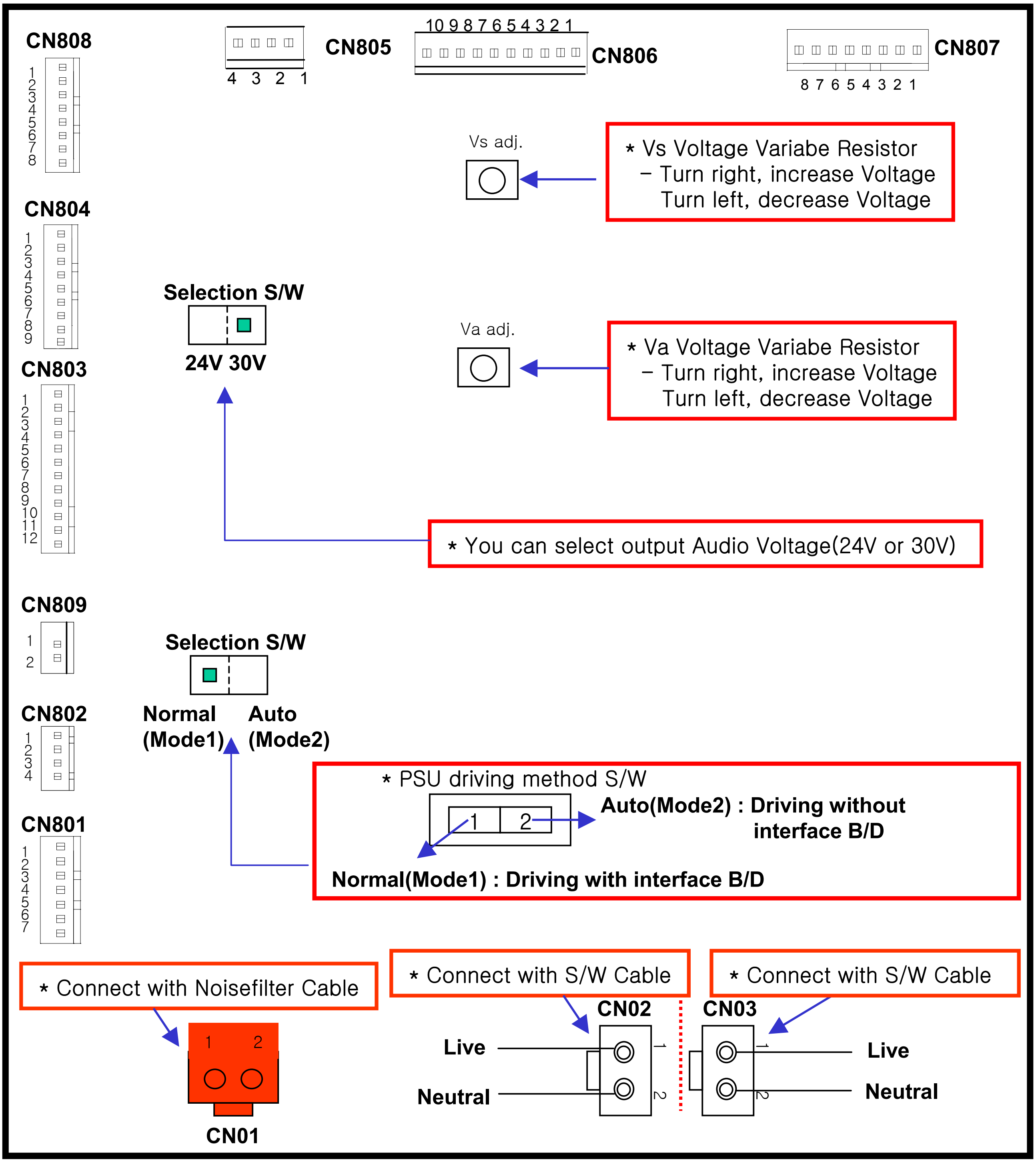




Location No.	Specification	Vendor
CN01	3-176976-2(Red)	AMP
CN02	3-176976-1(Natural)	AMP
CN03	3-176976-1(Natural)	AMP
CN801	171825-7	AMP
CN802	171825-4	AMP
CN803	1-171825-2	AMP
CN804	171825-9	AMP
CN805	1-1123723-4	AMP
CN806	1-1123723-0	AMP
CN807	1-1123723-8	AMP
CN808	171825-8	AMP
CN809	171825-2	AMP



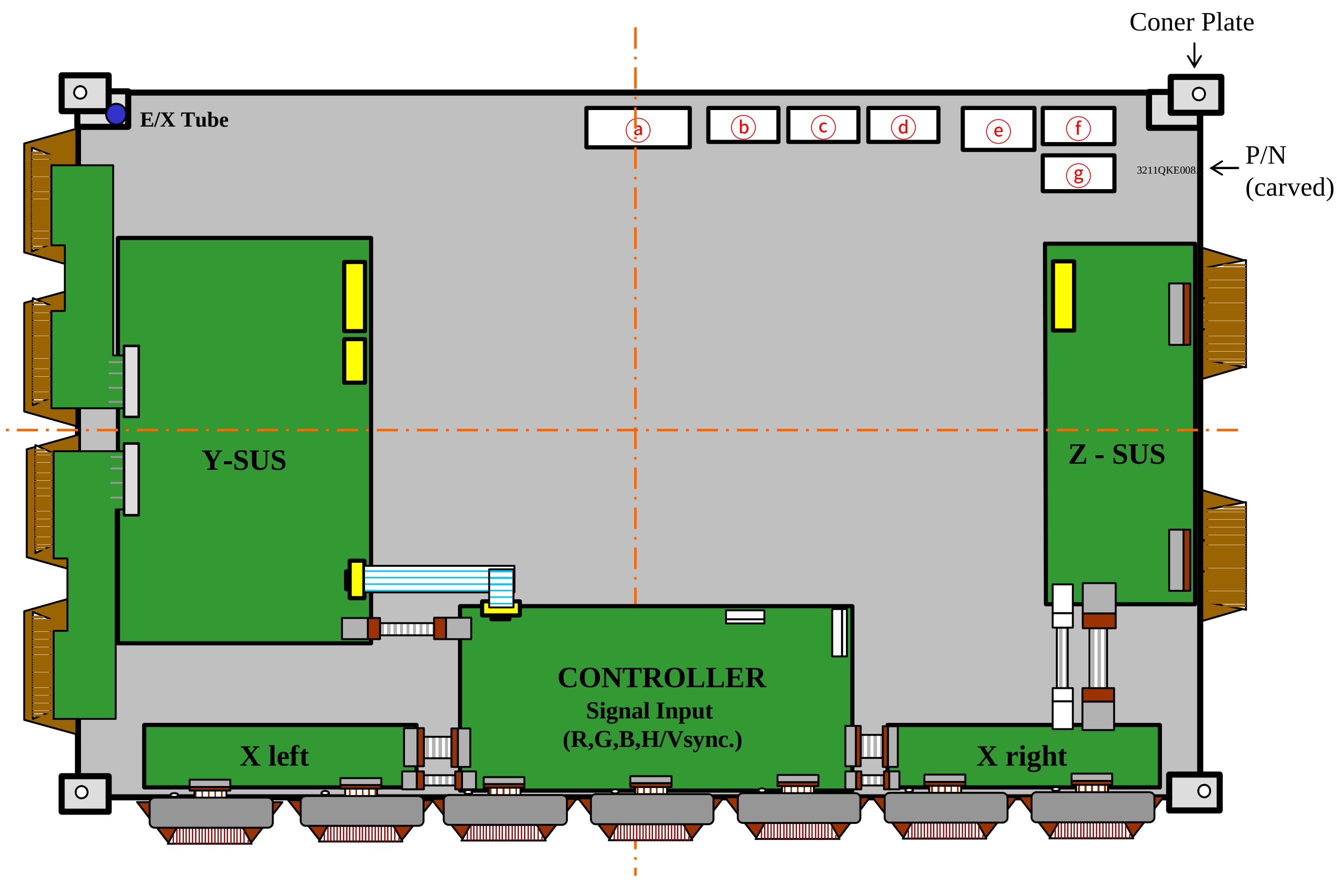
9. Adjustment detail



※ The color of CN01 is red.(The color of CN02, CN03 are natural.)

8. LABEL

❑ LABEL Sticking Position



❑ Identification Label : LABEL ⓐ



① Model Name
② Bar Code (Code 128, Contains the manufacture No.)
③ Manufacture No.
④ The trade name of LG Electronics
⑤ Manufactured date (Year & Month)
⑥ Manufactured place

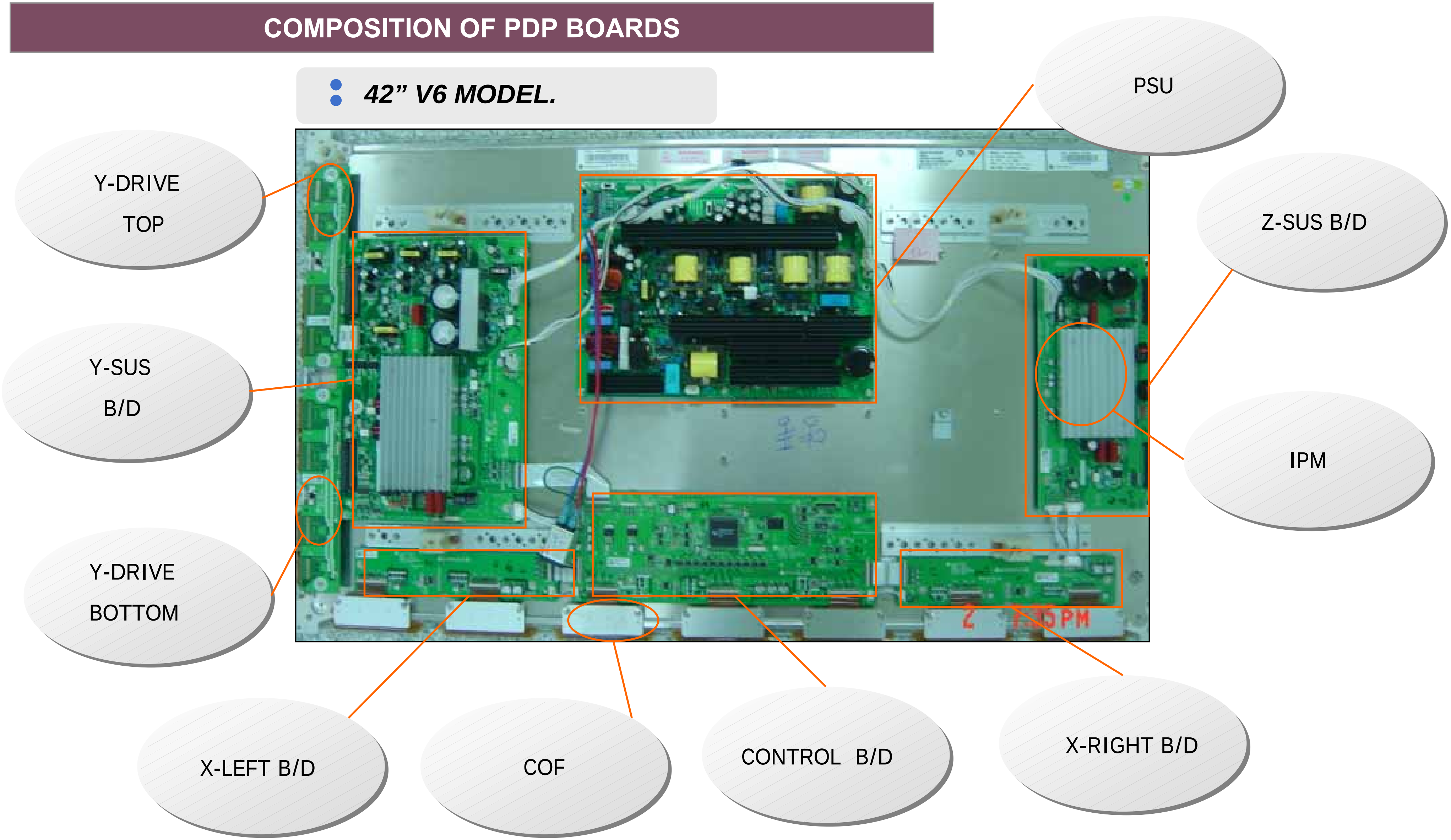
Trouble Shooting Manual of PDP Module

- Introduction
- Precautions
- Basic
- Trouble shooting

1. Introduction

COMPOSITION OF PDP BOARDS

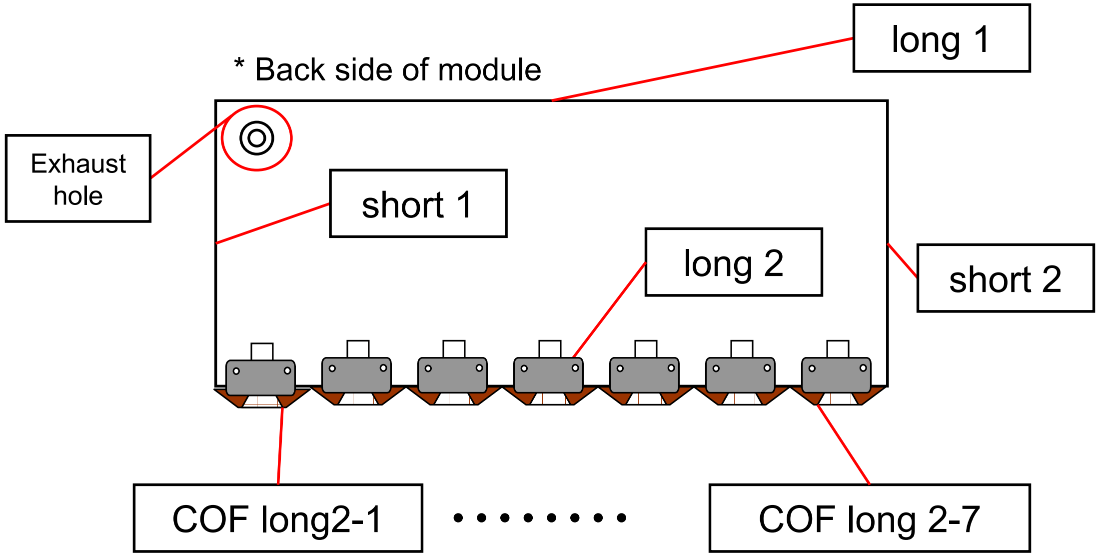
- ***42" V6 MODEL.***



1. Introduction

Definitions

■ Definition of MODULE position



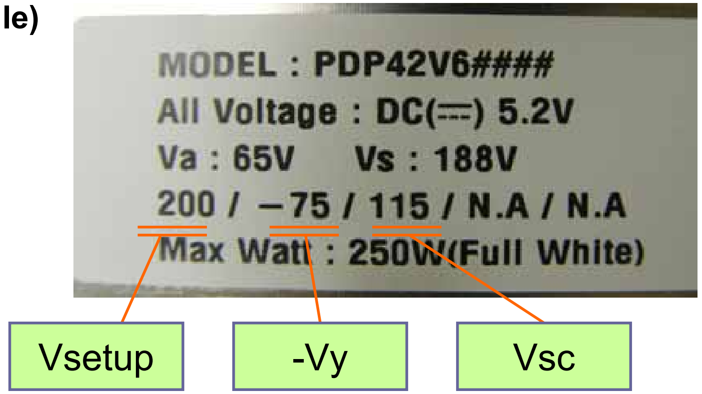
■ Identification label



① Model Name
② Bar Code (Code 128, Contains the manufacture No.)
③ Manufacture No.
④ The trade name of LG Electronics
⑤ Manufactured date (Year & Month)
⑥ The place Origin
⑦ Model Suffix

1. Introduction

■ **Voltage label (Attached on back side of module)**



■ **Part No. label (Attached on board)**





BOARD ASS`Y PART NO.

BOARD NAME

BOARD SERIAL NO.

PCB PART NO.

■ **COF serial No. label (attached on COF)**

COF SERIAL NO.



1. Introduction

■ **Terms of defect**

Term	Appearance
Add short (line on)	
Add open (line off)	
Sus short (line on)	
Sus open (line off)	

2. Precaution

Safety precautions

Be sure to read this before service. When using/ handling this PDP module, Please pay attention to the below warning and cautions.

1. Before repairing there must be a preparation for 10 min.
2. Do not impress a voltage that higher than represented on the product.
3. Since PDP module uses high voltages, Be careful a electric shock
   and after removing power some current remains in drive circuit.
   so you can touch circuit after 1 min.
4. Drive circuits must be protected from static electricity.
5. The PDP module must be Moved by two man.
6. Be careful with short circuit of PDP boards when measuring any voltages.

Before request service

1. Check panel surface and appearance of B/D.
2. Check the model label. Whether it is boards of same model with label.
3. Before requesting Service, please inform us a detail defect phenomenon and history of module.
   it can be helpful to us for a smooth sevice.

Ex) COF long 2-1 fail ,address 1 line open, Y b/d problem , mis-discharge.

2. Precaution

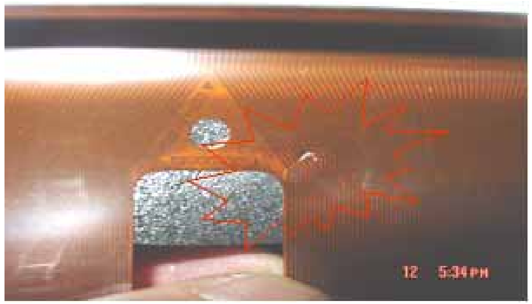
Handle with care (COF)

COF is the most important component in the PDP module.

Even a little imperfection of COF can make a serious screen problem.



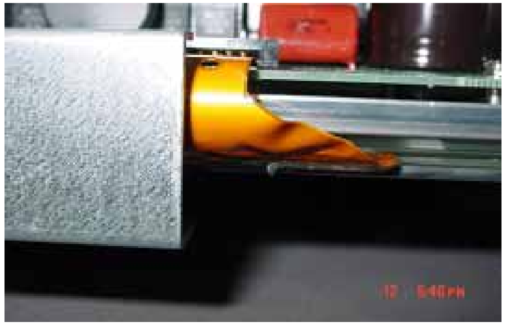
SCRATCHING



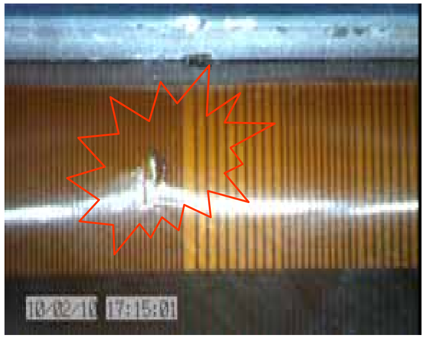
TEARING



BEING PUSHED



BENDING



CHOPING

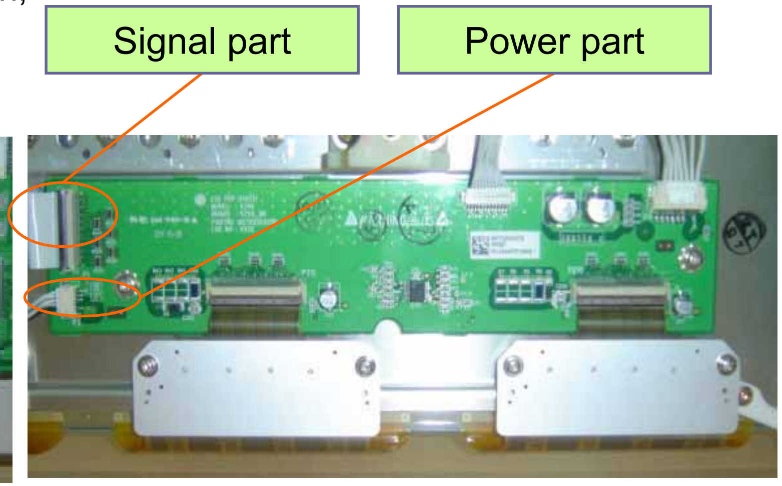
3. Basic

1. X B/D

: receiving LOGIC signal from CONTROL B/D and make ADDRESS PULSE(generates Address discharge)by ON/OFF operation, and supplies this waveform to COF(data)

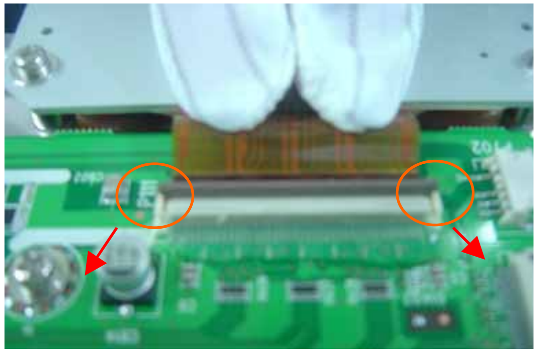


X LEFT B/D

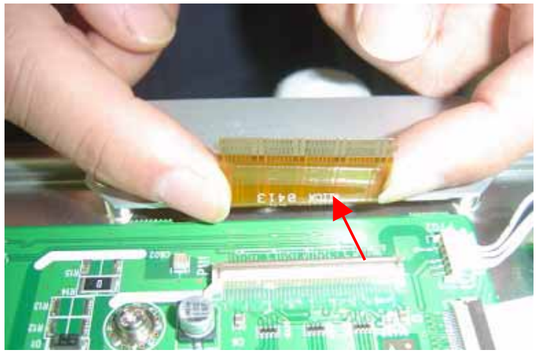


X RIGHT B/D

<COF Separating>



Lift up lock as shown in narrow.



Pull COF
as shown in narrow.

2. Z sustain B/D

: make SUSTAIN PULSE and ERASE PULSE that generates SUSTAIN discharge in panel by receiving LOGIC signal from CONTROL B/D.

this waveform is supplied to panel through FPC(Z).

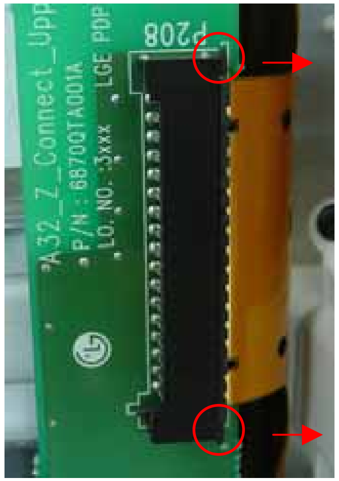
*composed with IPM,FET,DIODE, electrolytic capacitor ,E/R coil.



* IPM (Intelligent Power Module)

E/R(Energy recovery)

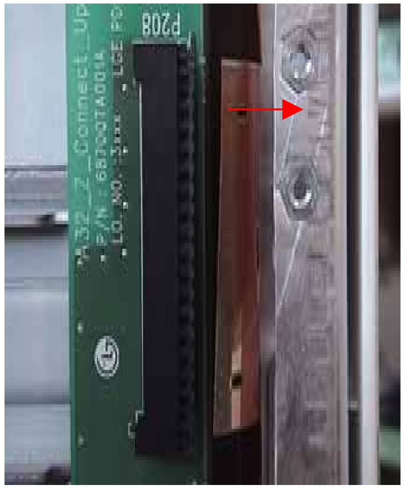
<FPC Separating>



Separate the fixed Screw of Z-Board.
Pull out Lock as shown in arrow.



Condition in Lock part is pulled



Pull FPC Connector
as shown in arrow.

3. Y drive B/D



1) This is a path to supply SUSTAIN ,RESET waveform which made
from Y SUSTAIN B/D to panel through SCAN DRIVER IC.

2) Supply a wave form that select Horizontal electrode (Y SUSTAIN electrode) sequentially.

- potential difference is 0V between GND and Vpp of DRIVER IC in SUSTAIN period.
- being generated potential difference between GND and Vpp only in SCAN period.

* In case of 42” V6 use DRIVER IC IC 8 EA (TOP, BOTTOM: each 4EA)

4. Y sustain B/D

: generates SUSTAIN,RESET waveform, Vsc(SCAN)voltage.
and supplies it Y DRIVER B/D.

* Composed with IPM,DIODE, electrolytic capacitor ,FET.



5. Control Board

: creates signal processing (Contour noise,reduction ISM,..)
and an order of many FET on/off of each DRIVER B/D with
R,G,B each 8bit input.

* Use 3.3V/5V 2 kinds of power .



6. DC/DC Converter part

: Being impressed 5V, Va ,Vs,
DC/DC converter makes
5V,Va,Vs,Vset_up,Vsc
which is essential for each B/D.
There is no DC/DC B/D in
model 40″ /42″ (1 POWER B/D).

* 50″ 60″ embedded DC/DC B/D
separately because of high power
consumption.



7. FPC (Flexible Printed Circuit)

: supply a driving waveform to PANEL by connecting a PAD electrode of PANEL with PCB(Y and Z).

* there is two type of this for Y B/D. One is single-sided, another is double-side. These are having pattern on it
* for Z B/D, there is no pattern , single-sided, and Beta type(all of copper surface).



8. FFC (Flat Flexible Cable)

: for connecting a Logic signal between B/D and B/D.

*There is 0.5mm pitch,50pin type
1mm pitch ,30pin type.



9. COF (Chip On Film)

: supply a waveform which made from X B/D to panel and select
a output pin that is controlled by COF when be on or off.
96 output pin per IC.

— the more the resolution higher, the less spare space where can set IC on it in B/D. without using IC PACKAGE, we can use a BARE IC , so we can get IC with LOW COST

— because we do not solder IC on PCB directly, a soldering defect rate decrease.

* composition

1) FPC + Heat /Sink

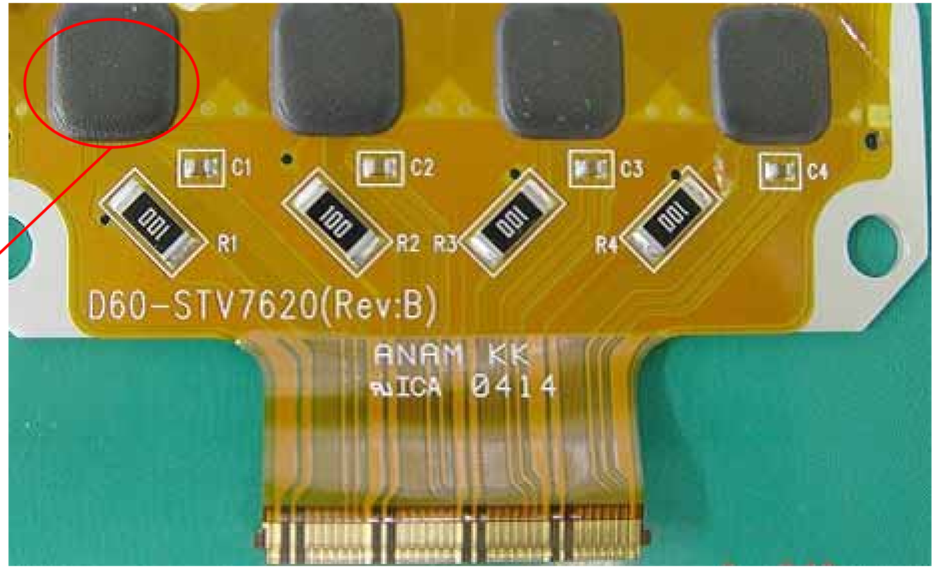
⇒ FPC for COF must have a Low Spec decline with getting damp

2) CHIP resistor + CHIP CAPACITOR

3) BARE IC (STV7610A/WAF) + GOLD WIRE/AL WIRE

4) EPOXY MOLDING

Bare IC



* 42 V6 COF is the same as 42V5.

10. IPM(Intelligent Power Module)

: composition

HEATSINK,CAPACITOR

DIODE

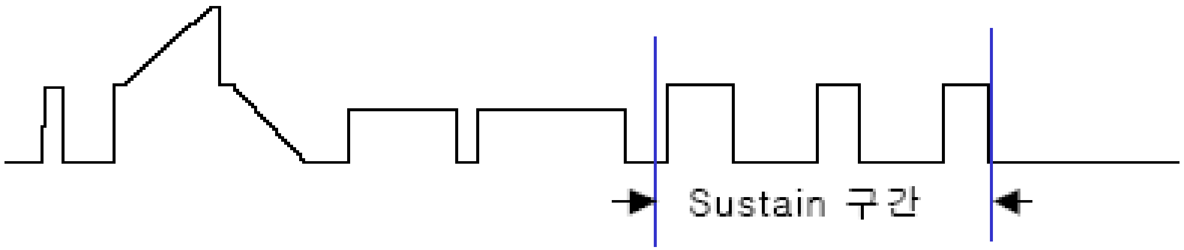
IC LINEAR

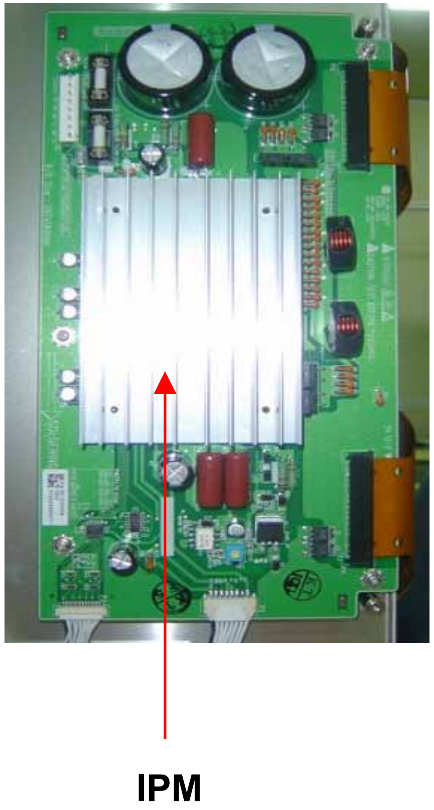
RESISTORTANSISTOR,FETS.

: description

Attached at Z B/D and Y B/D, make Sustain waveform.

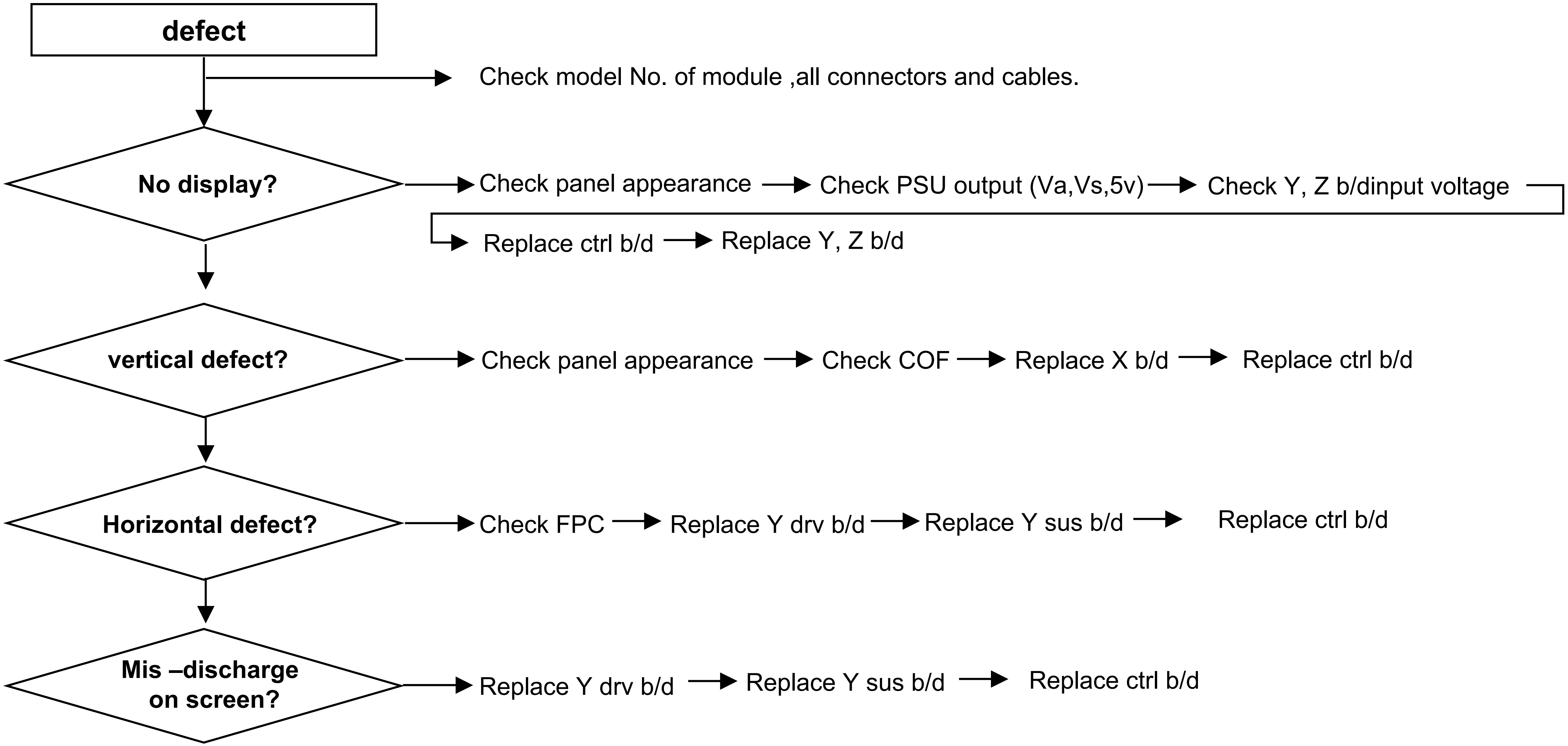
Sustainer : supply a square wave to panel to make a video.





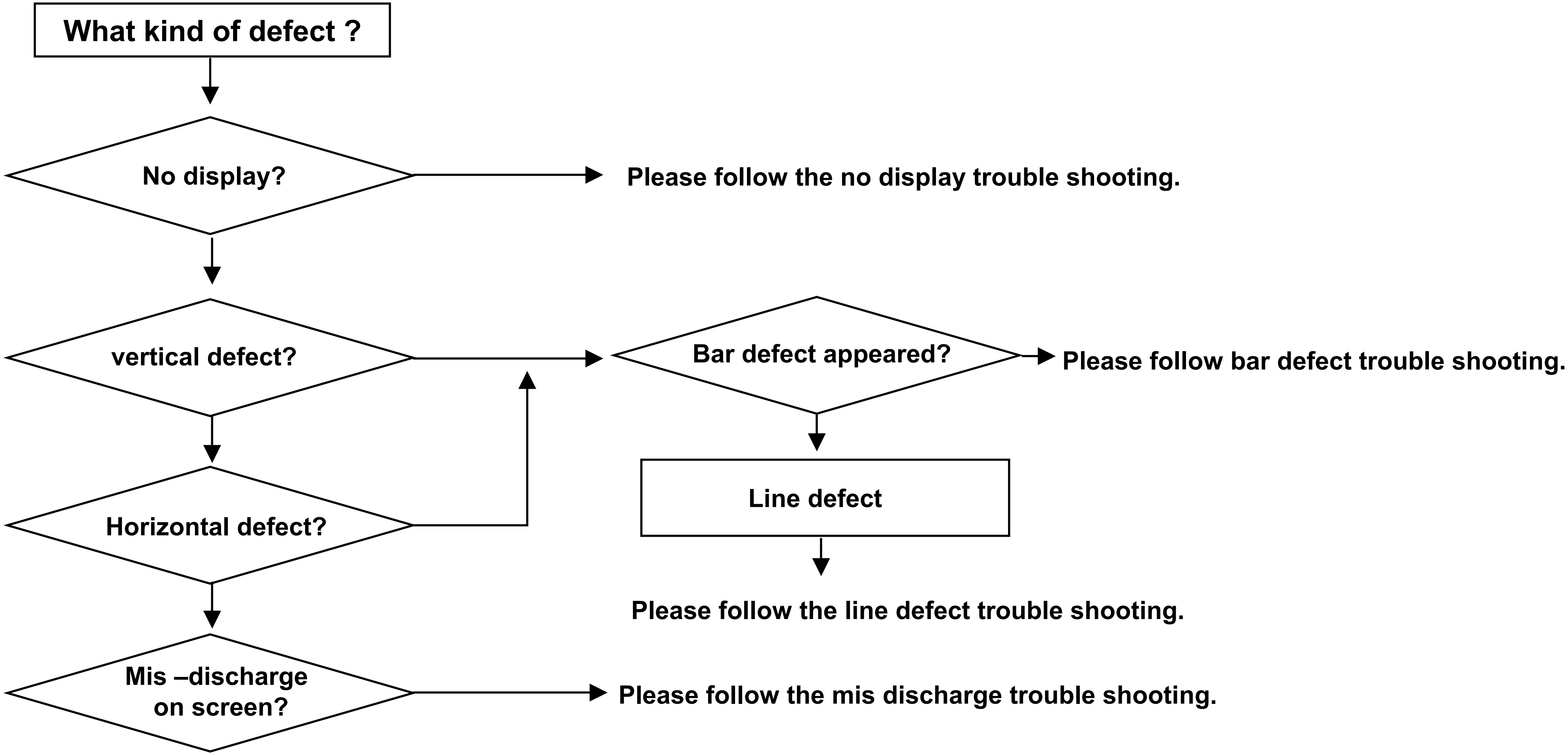
4. Trouble shooting.

Fast check up



4. Trouble shooting.

Logical judgment



• *No display*

Check each section with following method if there is problem, replace or repair that part.
If not go to the next section.

1. Connector

Confirm every Connector (PSU, Y-SUS, CTRL, Z-SUS)
⇒ module may not be normal by mis-connection which can not send signal and power.
Also Mis connection for a long time has a specific b/d failed.



CTRL B/D + Y-SUS



CTRL B/D + Z-SUS



CTRL B/D + X-B/D



Signal input(LVDS)

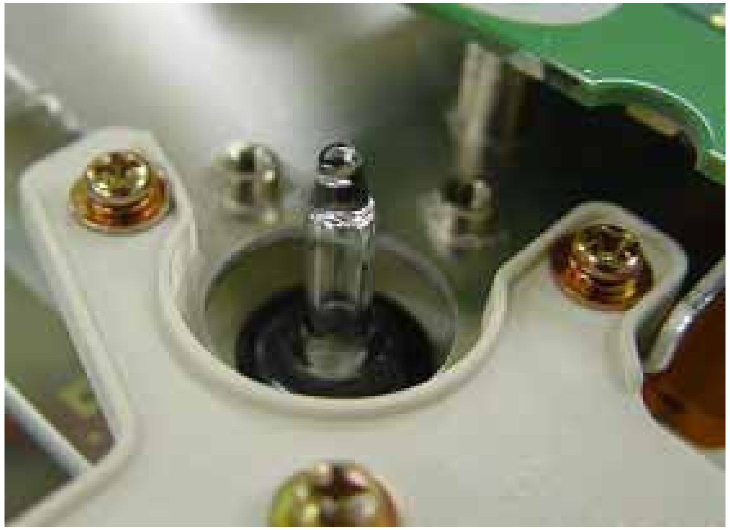
2. Exhaust tip Crack

Confirm exhausting Tip and find Crack with naked eyes to check vacuum state.

If there is problem replace the module .

⇒ in case of vacuum breakdown, module makes a shaking noise because of inside gas ventilation.

(there may be a small crack which could not see with naked eyes. And this noise is different from Capacitor noise.)



NORMAL



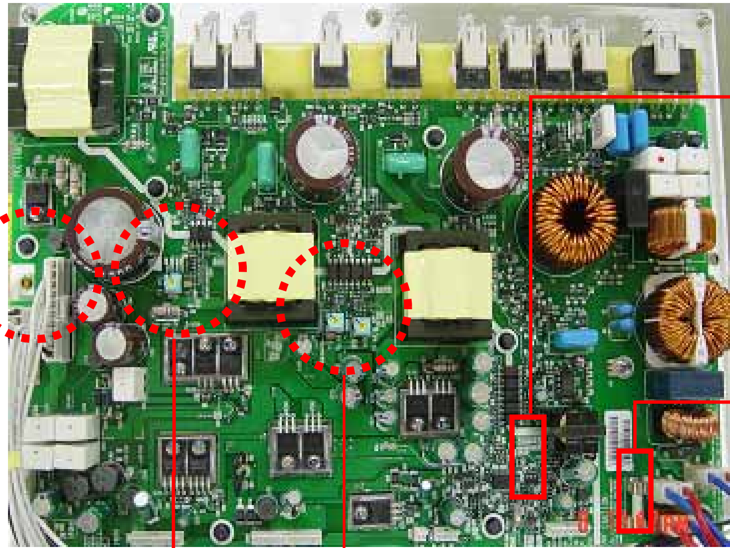
CRACKED

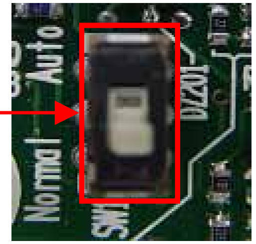
3. PSU(Power Supply Unit)

1. Check each unit part of PSU inside with naked eyes.
   (capacitor, FET, a kind of IC, resistor)
2. Check FUSE and SW1 (on Normal).
3. Check Output voltage which is converted from AC V
   to DC V.
   voltage Check (5V, Va, Vs)

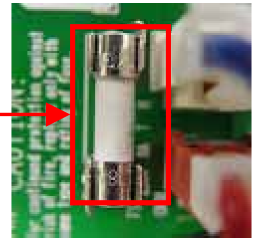
※ When PSU Protection occurred. Check Short
between Y-SUS, Z-SUS B/D .

Confirm input voltage → if not same → **Adjust voltages**



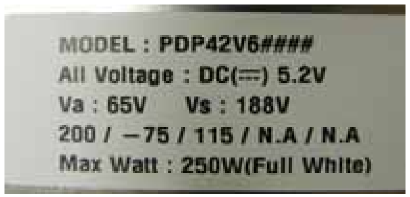


SW1 Normal

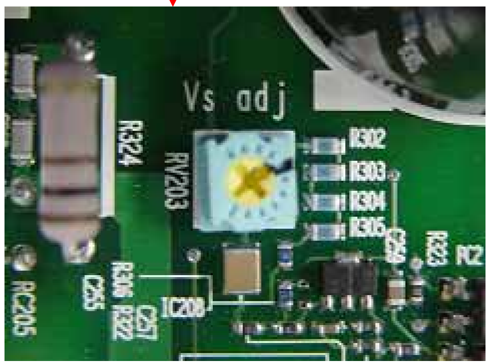


Fuse open check




MODEL : PDP42V6####
All Voltage : DC(⎓) 5.2V
Va : 65V Vs : 188V
200 / –75 / 115 / N.A / N.A
Max Watt : 250W(Full White)

Multi-meter Touch point
(5V, Va ,Vs must accord with Module Label)



Vs Voltage ADJ
(Vs : About 180 ~195 V)



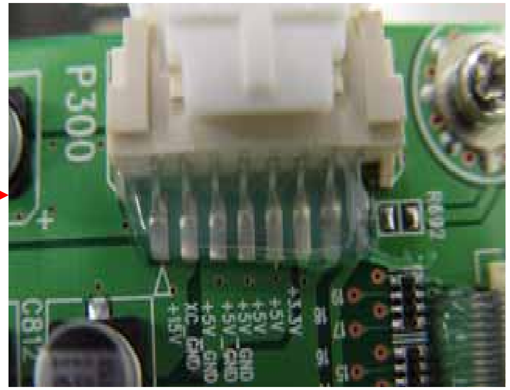
Va, 5V(VCC) Voltage ADJ
- ■ Va : About 55 ~65 V
- ■ 5V(VCC) : 5V~5.5V)

4. Trouble shooting.

4. Ctrl B/D

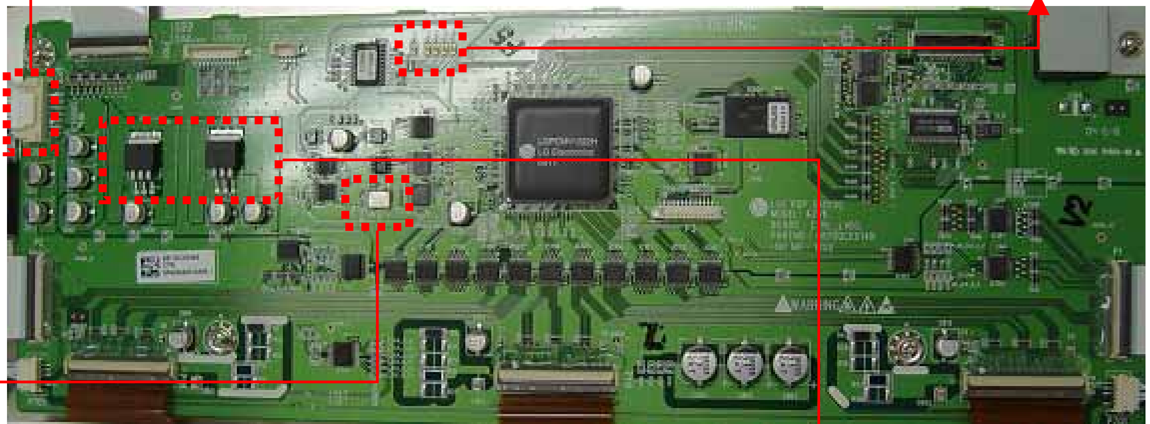
1. Confirm LED D17(flashing) ,13 lighting
2. If not CHECK OSC X1 output.
3. Check CTRL input voltage
   (CONNECTOR P300)
4. CHECK 3.3V, 5V,15V.
5. Check IC 11 3.3V
   IC 3   2.5V

Input voltage



Diode





OSC(X1)

Probe
Touching
point

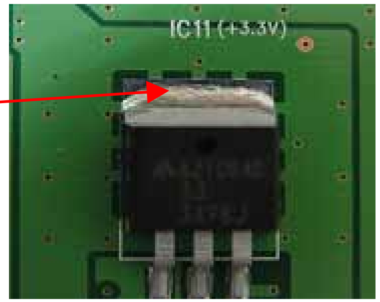


Check oscillating state.
(normal 100 MHZ)
Be careful with physical shock.

Check IC 11,13

DMM +

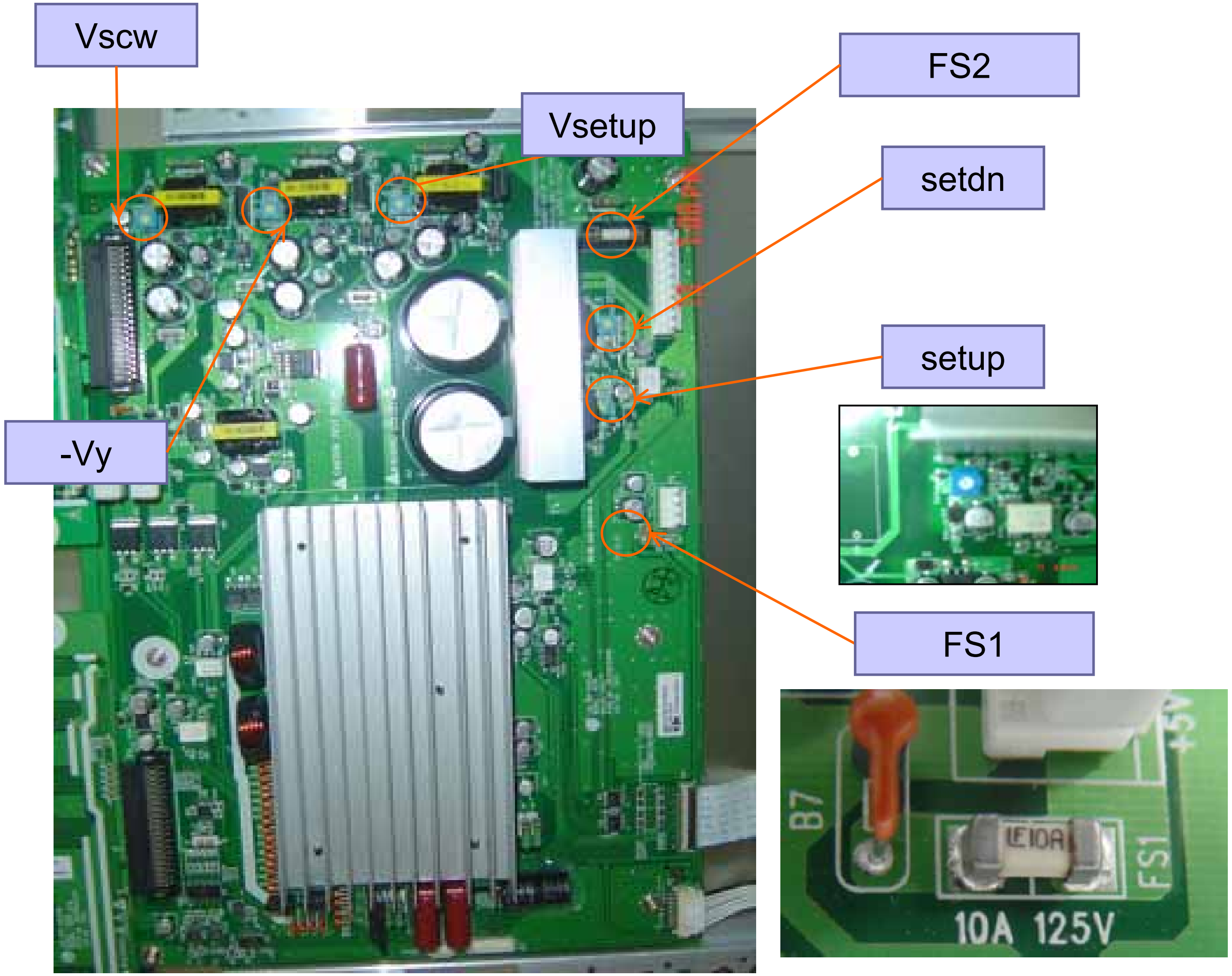
DMM – (GND)





5. Y-sus B/D

1. Check FUSE [FS1(5v) ,FS2(Vs)].
2. Check voltages(Vsetup,-Vy, Vscw)
3. Check DIODE between GND and Y SUS output.
   [SUSUP(OC2) SUSDN(OC1)].
   forward=0.4 ,reverse=OVERLOAD.
4. Check whether output voltages agrees
   with voltage that represented in label.



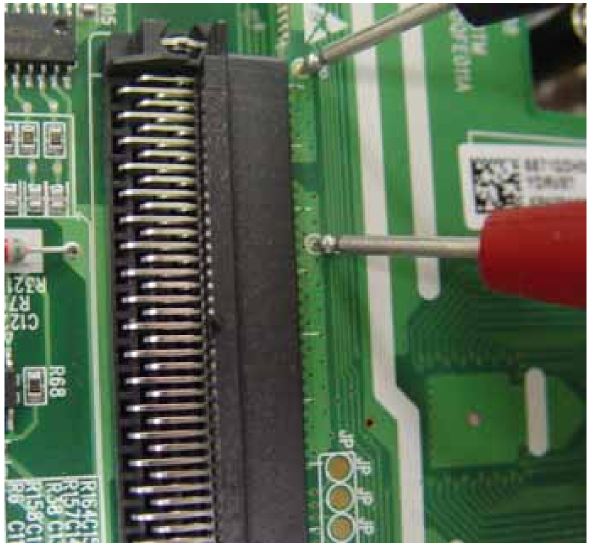
4. Trouble shooting.

■ Check whether output voltages agrees with voltage that represented in label.

■ Check diode value GND between Y-SUS output.



Normal diode value= 0.4 (forward)



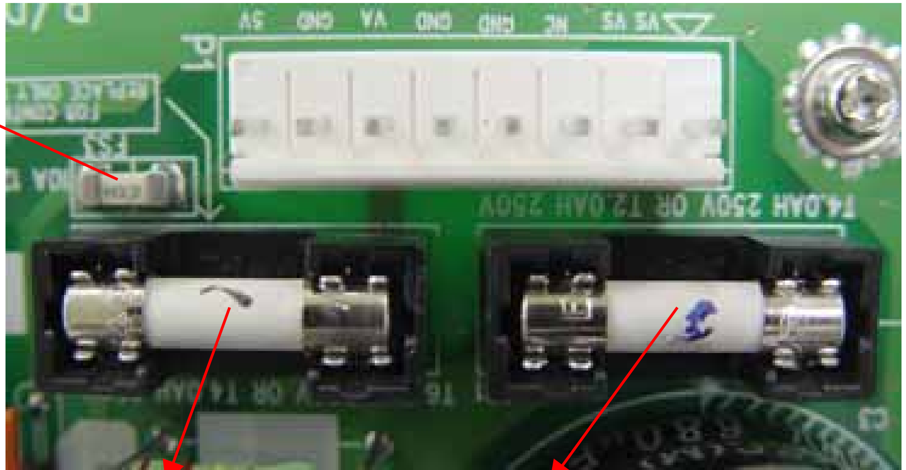
Normal diode value = OL (reverse)

6. Z-sus B/D

1. Check the FUSE.
2. Check input voltages.(Va, 5V,15V)
3. Check FPC out put diode value.
4. Check ramp waveform.

■ Check the FUSE

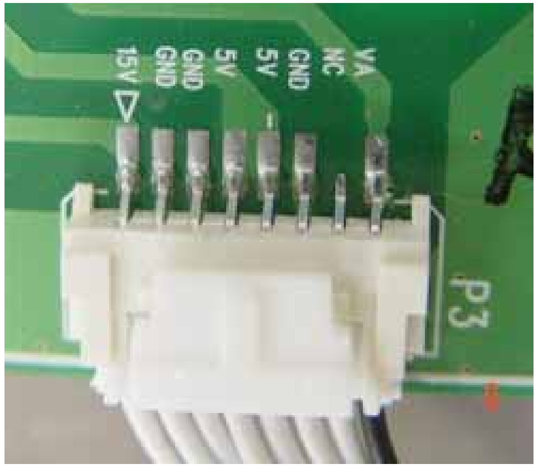
5V FUSE



Va FUSE 6.3A

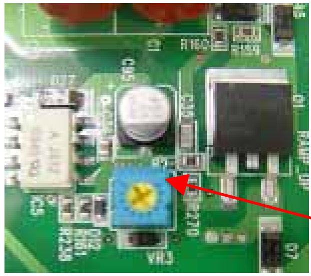
Vs FUSE 2A or 4A

■ Check input voltages



4. Trouble shooting.

■ Variable resistance of Z RAMP waveform slope.





■ Check FPC output diode value.

caution: check certainly after removing FPC.



Normal diode value=0.375(forward)



Normal diode value=OVER LOAD(reverse)

4. Trouble shooting.

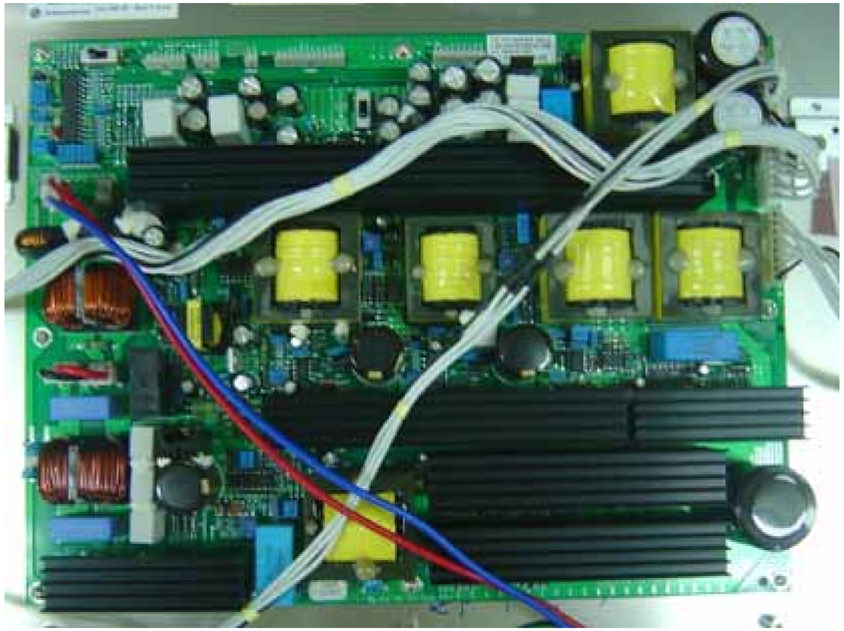
◎ Power protection

It is power protection when power is off automatically within 2~3 min. from power on.

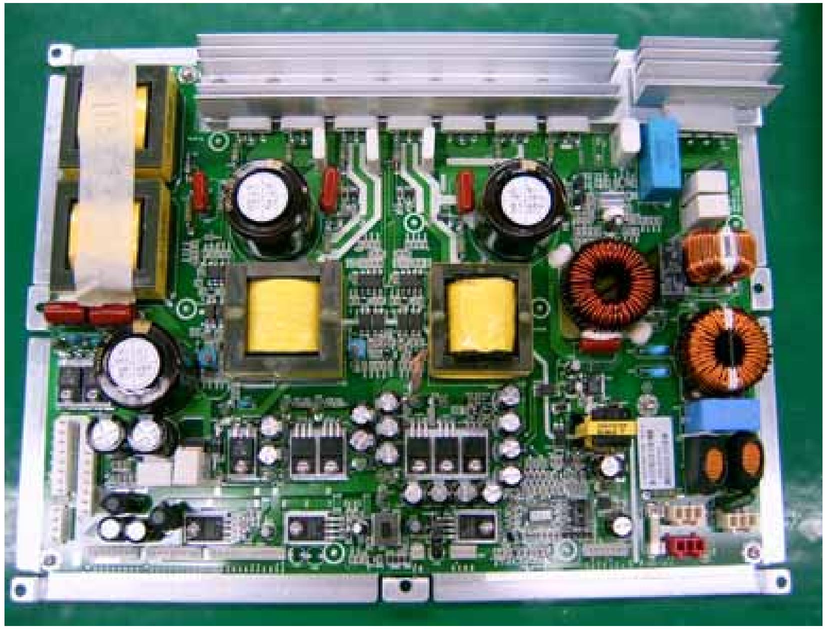
Power protection function protect the boards when occurred short on circuits of PDP module or power problem.

If can not impress power even after replacing PSU, find out where the short occurred.

*** PSU makers.**



DAEGIL PSU



UNICON PSU

4. Trouble shooting.

Vertical defect (bar)

Check each section with following method if there is problem, replace or repair that part.

If not go to the next section.

1. Connector

Check COF connector.

If not connected well,it will Make a bar defect .

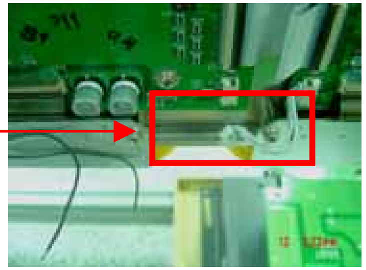
Check here

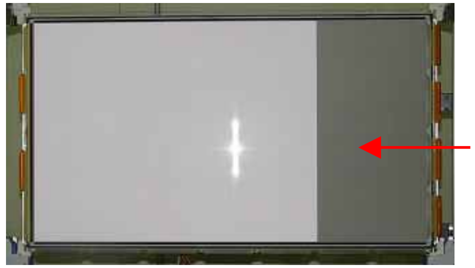




Bar

Check here



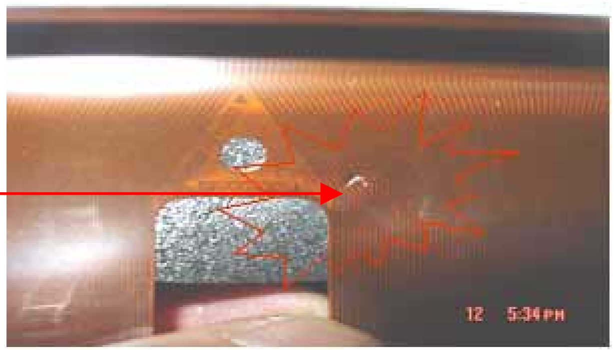


Off

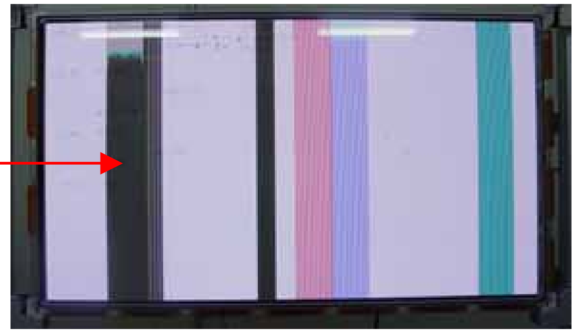
2. Checking COF

Confirm whether COF was torn. And then check input of COF resistor and IC.

Tearing



COF 6 is torn partly



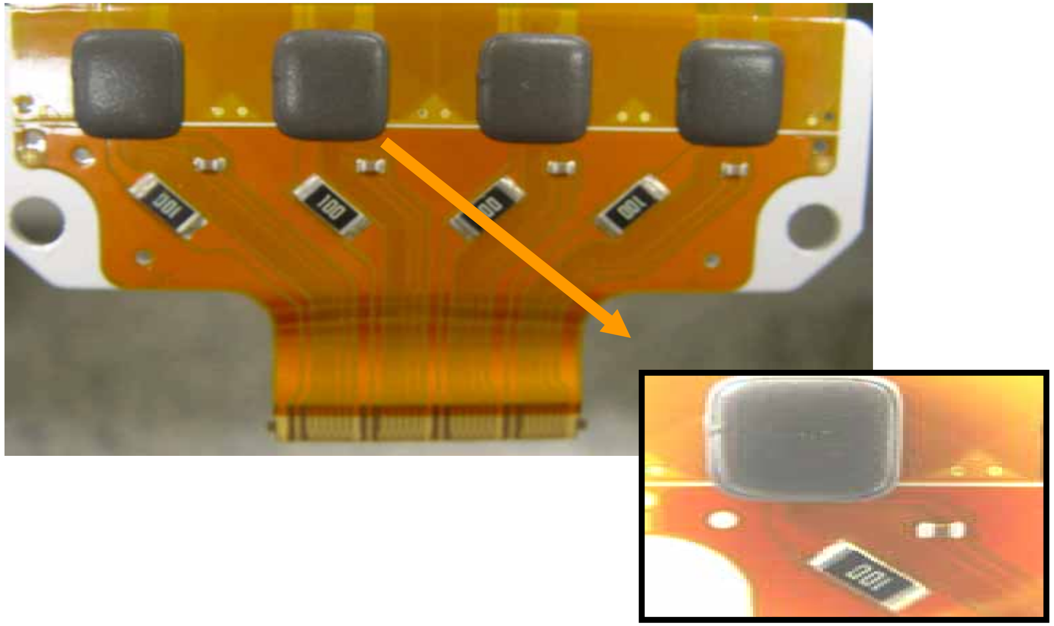
◎ Checking address COF input of resistor and IC

■ COF resistor checking

Check the both side of resistor With Digital multi meter(DMM) .

If the resistor is normal, the resistor value will be 10.2 ~ 10.8 Ω

But if not, the value will be 0 or infinity and replace the resistor.



◎ Checking address COF input of resistor and IC

■ IC input checking

Inside of IC , there is 4 ea diodes which separated in 2 series .

(input 2, output 2)

*how to check

1.contact DMM - terminal to a right terminal of condenser(GND)

and DMM + terminal to a right terminal of IC, normal value 0.66 (fig.1)

2.contact DMM - terminal to Output terminal of resistor, and

DMM + terminal to a right terminal of IC , normal value 0.73 (fig.2)

Fig. 1

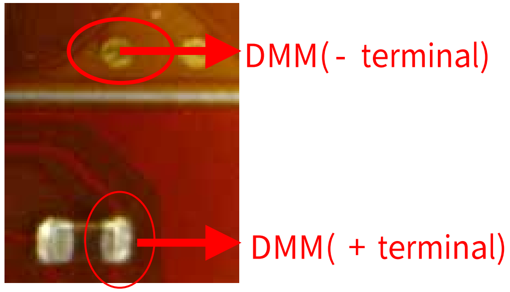
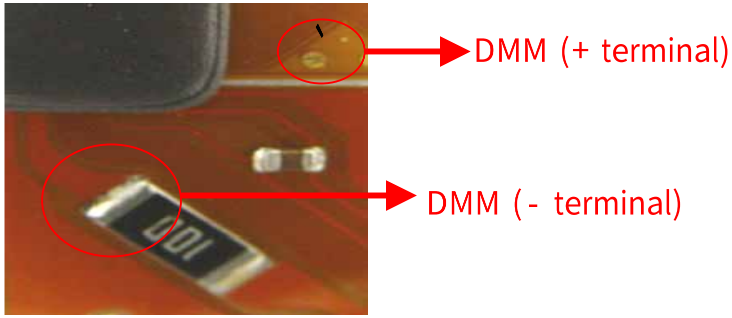


Fig. 2



3. Ctrl B/D

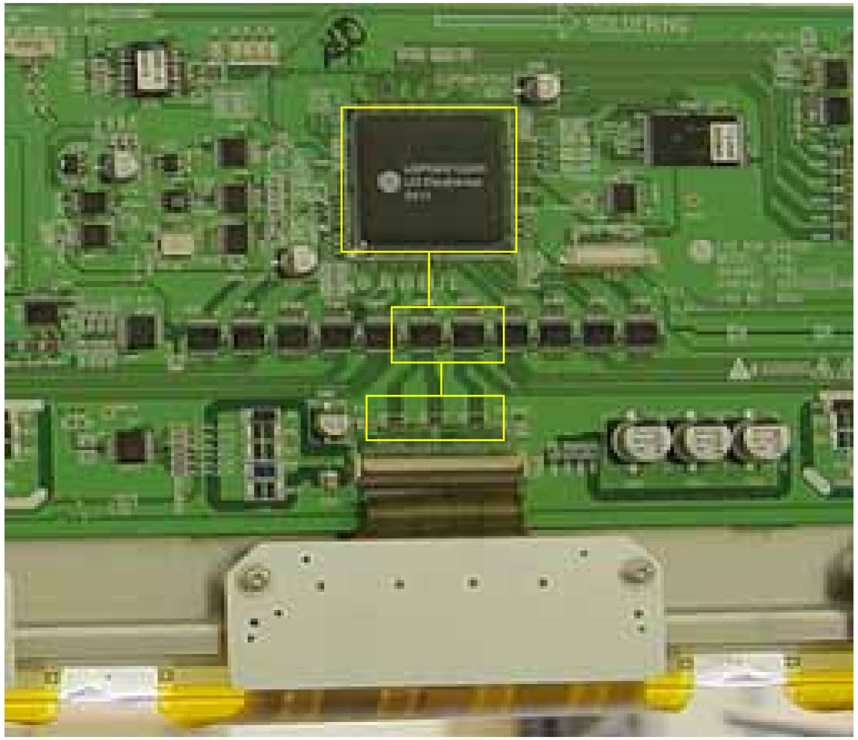
CTRL B/D supplies video signal to COF. So if there is a bar defect on screen,

It may be the ctrl b/d problem.

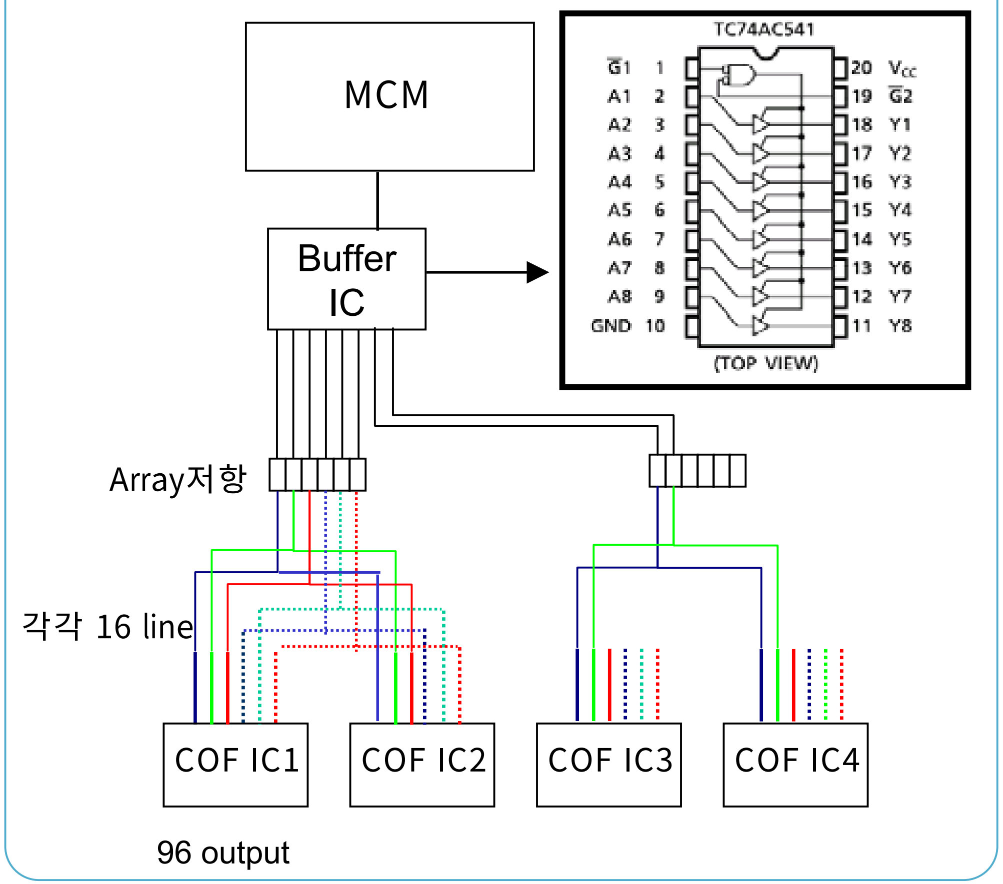
A flow of address signal

In this figure, we can easily suppose

what will be appeared on screen when a specific part failed.



<Diagram of ctrl b/d>



Vertical defect (line)

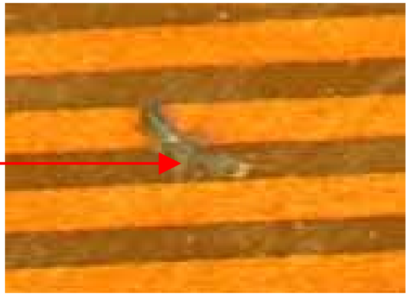
In case of 1 line open or short , check foreign substances in COF connector.

First blow up foreign substances with your mouth. And then if the same line appears, replace the panel.

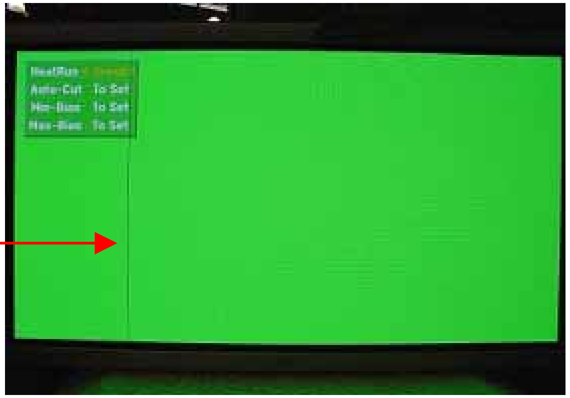
1 line open or short

This phenomenon is due to COF IC inside short or adherence part of the Film and rear panel electrode problem.
In this case, replace the panel.

1 electrode open

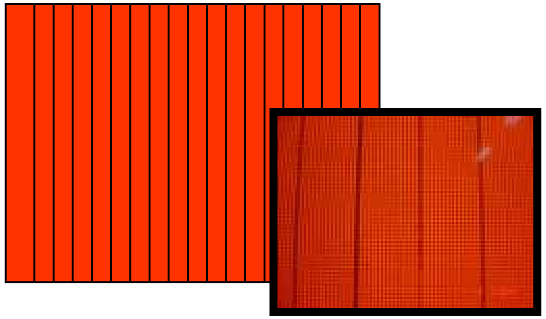


1 line open



Line open or short with same distance.

This is MCM of Ctrl b/d defect. MCM can not be replaced separately. So replace the ctrl b/d.



MCM (Multi Chip Module)



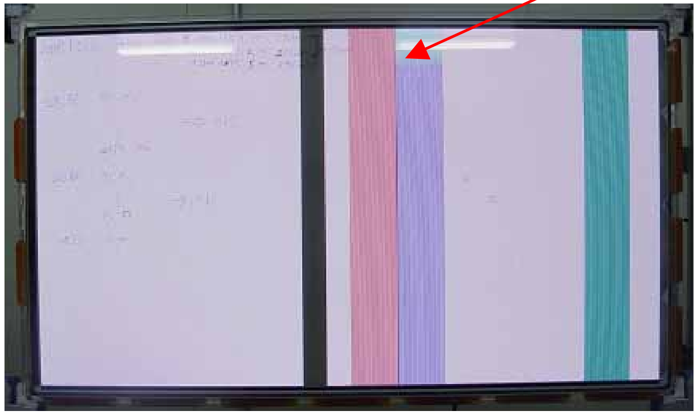
4. Trouble shooting.

line defect from each parts

• **Case 1: Buffer IC fail**

COF IC 1,2 ⇒ 192 line(96+96) open.

COF IC 3,4 ⇒ 64 line open (with fixed interval there is on,off ……. Repetition)

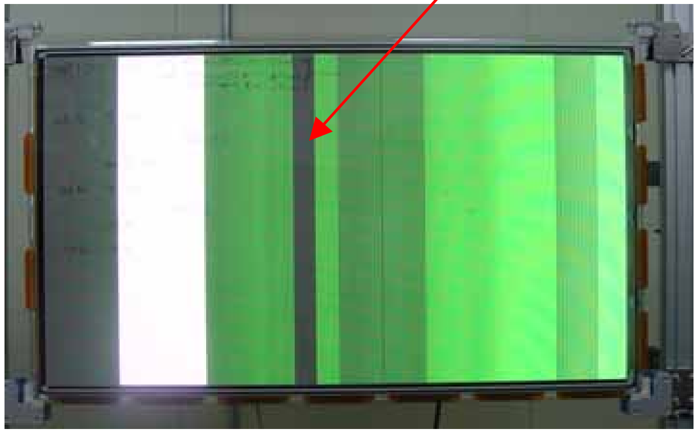


• **case 2 : Array resistor fail**

COF IC1 ⇒ 16 line , COF IC2 ⇒ 16 line open

• **case3 : COF IC fail**

96 line open.



4. Trouble shooting.

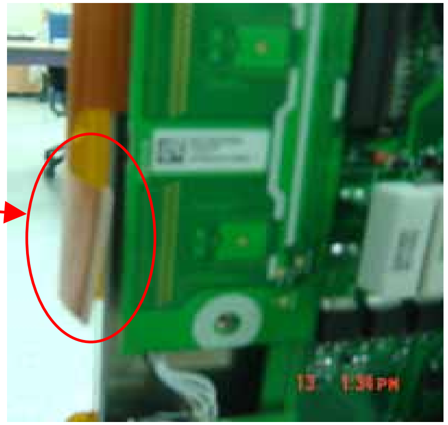
Horizontal (bar)

Most horizontal defects can be repaired. In case of adherence part of the Film and rear panel electrode defect or panel electrode open,short , replace the panel.

1. Connector

It can make a horizontal bar that connector on Y b/d and Z b/d did not plugged well. Because sustain voltage can not be supplied to panel. So check connectors (FPC, Y drv –Y drv) first.

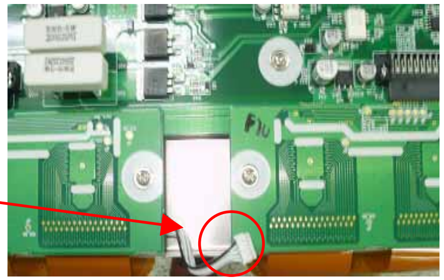
Disconnected





Horizontal bar

Disconnected





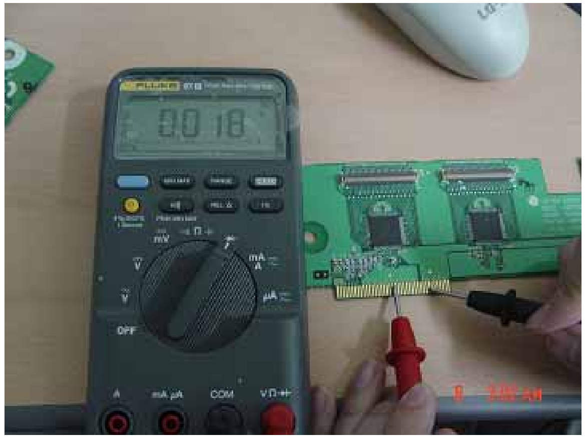
Screen off

2. Scan IC check

Check diode value of the right side part of output pin.

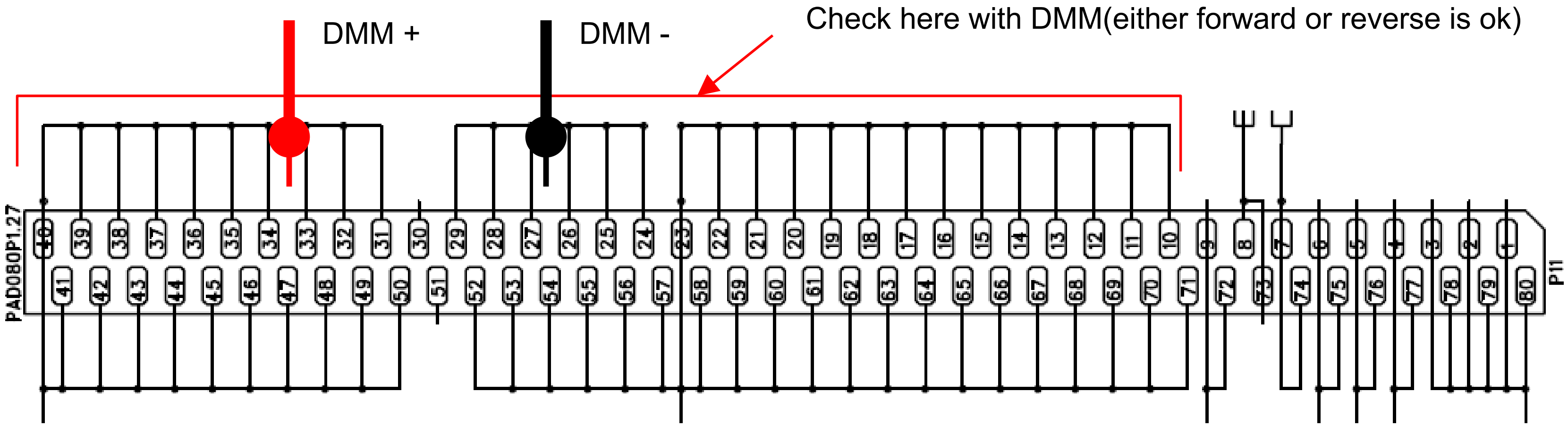


Normal diode value. (in case of Panasonic IC=1.035)



Defect diode value= 0.018

* It can be different from each IC Maker. (in case of TI IC= 0.6~0.7)



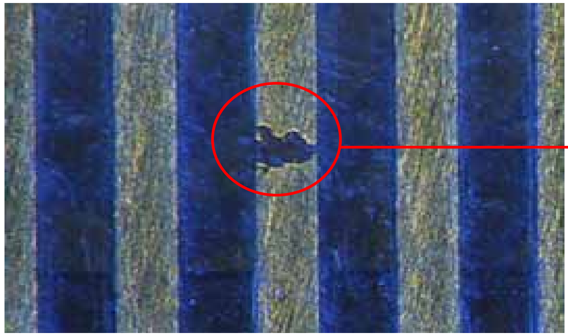
4. Trouble shooting.

Horizontal (line)

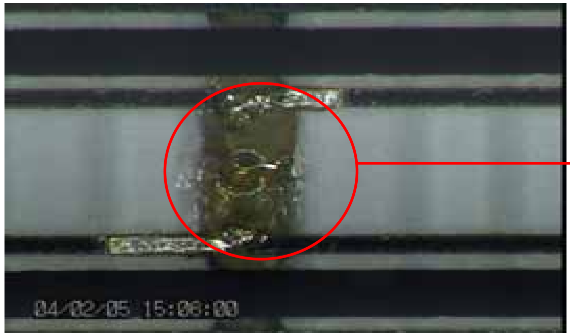
1. Check FPC

In case of horizontal 1 or more line, it is due to FPC or panel inside .

ctrl b/d, Y b/d is just normal.

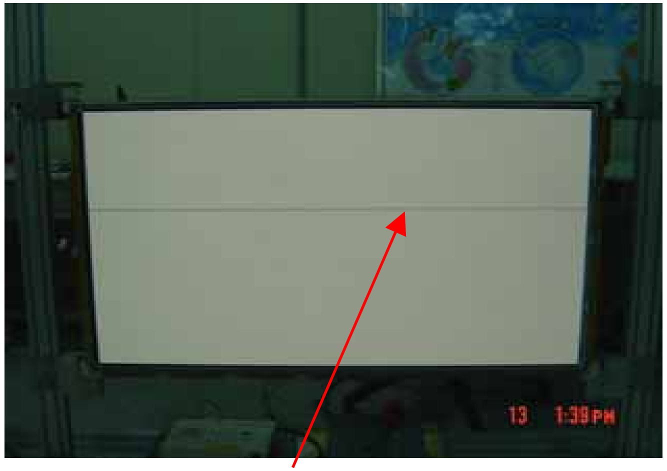


FPC electrode open



Panel electrode

Insulation break down



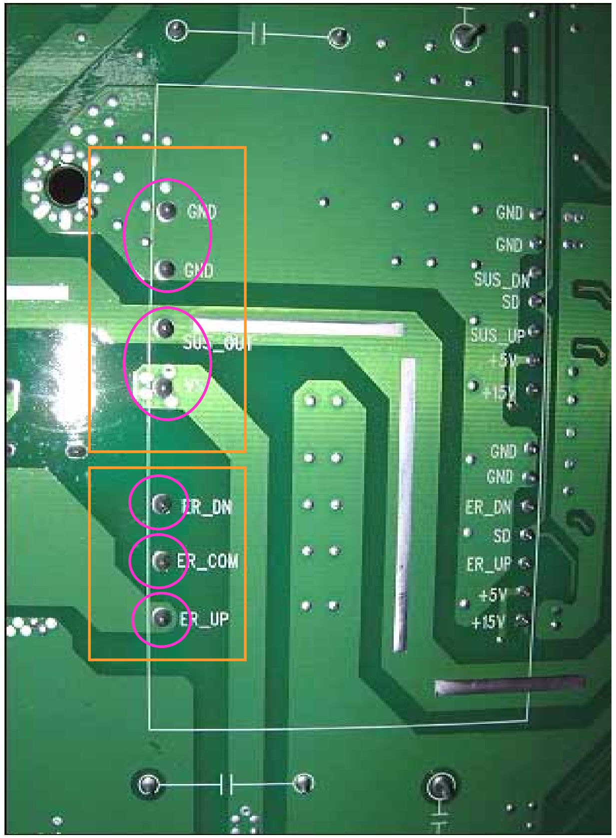
Horizontal 1 line.

2. Check scan IC

Check with same method that presented in Horizontal (bar).

4. Trouble shooting.

◎ How to check IPM



Forward : test 1 GND(＋) , Sus-out(－)
2 Sus-out(＋),Vs(－)
3 ER-DN(－),ER-COM(＋)
4 ER-COM(－),ER-UP(＋)

when each 4 TEST Diode value is over 0.4V => **OK**

Reverse : test 1 GND(－) , Sus-out(＋)
2 Sus-out(－),Vs(＋)
3 ER-DN(＋),ER-COM(－)
4 ER-COM(＋),ER-UP(－)

when each 4 nodes TEST Diode value is infinity => **OK**

※ Specially, the value of ER-UP,COM,DN in the Y/Z board, should be checked all of them. but, the terminal of Vs,Sus-out,GND, we must aware to know after check one of IPM because it is parallel.

→ **if no problems, check 15V(Y,Z B/D) with GND, ➔ Forward value 0.3V, Reverse value infinite. If no problems,**

CAUTION

❑ General

1) Do not place this product in a location that is subject to heavy vibration, or on an unstable surface such as an inclined surface. The product may fall off or fall over, causing injuries.

2) When moving the product, be sure to turn off the power and disconnect all the cables. While moving the product, watch your step. The product may be dropped or fall, leading to injuries of electric shock.

3) Do not place this product in a location that is subject to heavy vibration, or on an unstable surface such as an inclined surface. The product may fall off or fall over, causing injuries.

4) Before disconnecting cable from the product, be sure to turn off the power. Be sure to hold the connector when disconnecting cables. Pulling a cable with excessive force may cause the core of the cable to be exposed or break the cable, and this can lead to fire or electric shock.

5) This product should be moved by two or more persons. If one person attempts to carry this product alone, he/she may be injured.

6) This product contains glass. The glass may break, causing injuries, if shock, vibration, heat, or distortion is applied to the product.

7) The temperature of the glass surface of the display may rise to 80°C or more depending on the conditions of use. If you touch the glass inadvertently, you may be burned.

8) Do not poke or strike the glass surface of the display with a hard object. The glass may break or be scratched. If the glass breaks, you may be injured.

9) If you glass surface of the display breaks or is scratched, do not touch the broken pieces or the scratches with bare hands. You may be injured.

10) Do not place an object on the glass surface of the display. The glass may break or be scratched.

Spare Part List for PDP4210EA

Item	Part Number	Part Description	Usage / Unit	Unit
1	E6205-001003	42" ED PDP Module	1	Piece
2	900-420103-01B	42" Glass Filter	1	piece
3	E7801-100001	Main PCBA	1	set
4	E7801-100002	Audio PCBA	1	set
5	771S42D101-01	ATSC PCBA	1	set
7	771-42D111-01	Control PCBA	1	set
8	771-42D111-02	IR PCBA	1	set
9	E4101-027001	Power Switch	1	piece
10	E4801-116002	Speaker	2	piece
11	E3301-028005	Speaker Terminal (without cable)	1	piece
12	E3404-157004	AC Power Cord	1	piece
13	E3421-926080	LVDS Cable	1	piece
14	E3421-925049	Connection Cable 1	1	piece
15	E3421-926083	Connection Cable 3	1	piece
16	E3421-926084	Connection Cable 4	1	piece
17	E3421-927001	Power Switch Cable 1	1	piece
18	E3421-927002	Power Switch Cable 2	1	piece
19	E3421-926081	Control PCBA Cable	1	piece
20	E3421-926094	IR PCBA Cable	1	piece
21	E7501-051007	Remote Control	1	set
22	E7301-010002	AAA size Battery	1	pair

Spare Part List for PDP4210EA

Item	Part Number	Part Description	Usage / Unit	Unit
23	200-42D131-MTK02AV	Front Plastic Frame	1	piece
24	277-42D101-01S	Function Knob	1	piece
25	263-42D101-01S	Power Lens	1	piece
26	269-42D101-01L	IR Lens	1	piece
27	481-42D107-01S	PCBA Shield Box	1	piece
28	483-42D103-01	PCBA Shield Top Cover	1	piece
29	436-42D118-01S	Terminal Frame	1	piece
30	402-42D114-01S	Metal Back Cover	1	piece
31	423-42D11E-01S	Power Switch Metal Frame	1	piece
32	510-42D101-MTU02K	Top Carton Box	1	piece
33	511-42D111-01K	Bottom Carton Box	1	piece
34	300-42D106-02C	Top Cushion	1	piece
35	300-42D105-02C	Bottom Cushion	1	piece
36	244-34B811-01	Carton Box Handle	2	piece
37	310-504004-01	Poly bag for Main Unit	1	piece
38	310-111404-07V	Poly bag for Instruction Manual	1	piece
39	580-P42AAEM-TU02L	Instruction Manual	1	piece
40	388-42SB04-01H	Power Socket Plate	1	piece
41	388-42D103-01H	Caution Plate	1	piece
42	387-42AA01-MTU02H	Model Plate	1	piece
43	388-42SB02-01H	Speaker Terminal Plate	1	piece
44	384-42D103-MTU01H	Terminal Plate	1	piece
45	590-42AA01-04	Warranty Sheet	1	piece

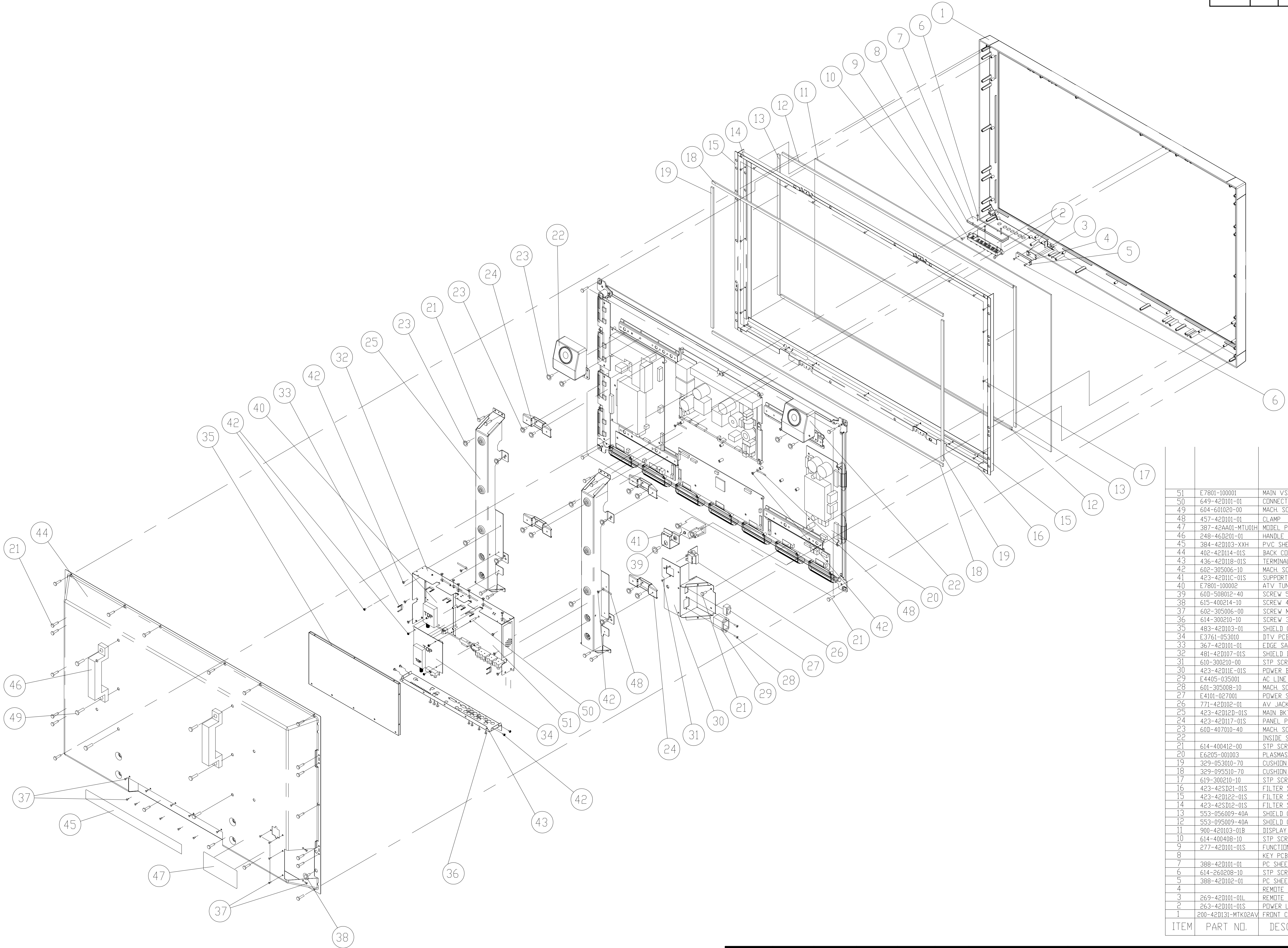
Spare Part List for PDP4210EA

Item	Part Number	Part Description	Usage / Unit	Unit
46	579-42D102-09	Model Plate Serial Number	1	piece
47	579-42AA01-05	Bar Code Label	1	pair
48	579-42D103-02	ON/OFF Label	1	piece
49	568-P46T02-02	Warning Label	1	piece
50	734-BP0302-01	Duck Feet Stand	1	set

Exploded View

NOTE : THIS RELEASED DRAWING WAS PRODUCED BY COMPUTER , DO NOT UPDATE MASTER MANUALLY

DWG. REV.	ZONE	DESCRIPTION	DATE	REVISOR



ITEM	PART NO.	DESCRIPTION	QTY	REMARK
51	E7801-100001	MAIN VSC PCB	1	
50	649-42D101-01	CONNECT BOSS	1	
49	604-601020-00	MACH. SCREW M6X20	6	
48	457-42D101-01	CLAMP	11	
47	387-42AA01-MTU01H	MODEL PLATE	1	
46	248-46D201-01	HANDLE	2	
45	384-42D103-XXH	PVC SHEET FOR MAIN BOARD	1	
44	402-42D114-01S	BACK COVER	1	
43	436-42D118-01S	TERMINAL SHEET	1	
42	602-305006-10	MACH. SCREW 3X6	41	
41	423-42D11C-01S	SUPPORT FOR PW BKT	1	
40	E7801-100002	ATV TUNER PCB	1	
39	60D-508012-40	SCREW 5X12	1	
38	615-400214-10	SCREW 4X14	1	
37	602-305006-00	SCREW M3X5	16	
36	614-300210-10	SCREW 3X10	5	
35	483-42D103-01	SHIELD COVER e-room	1	
34	E3761-053010	DTV PCB	1	
33	367-42D101-01	EDGE SADDLE 14MM	6	
32	481-42D107-01S	SHIELD BOX SANAUI	1	
31	610-300210-00	STP SCREW 3X10	2	
30	423-42D11E-01S	POWER BKT FOR V5/V6	1	
29	E4405-035001	AC LINE FILTER	1	
28	601-305008-10	MACH. SCREW 3X8	2	
27	E4101-027001	POWER SWITCH	1	
26	771-42D102-01	AV JACK PCB	1	
25	423-42D12D-01S	MAIN BKT FOR V6/FORMOSA	2	
24	423-42D117-01S	PANEL PATCH FOR V6	4	
23	60D-407010-40	MACH. SCREW W/SP WASHER 4X10	21	
22		INSIDE SPK BOX	1	
21	614-400412-00	STP SCREW 4X12	34	
20	E6205-001003	PLASMAS module LG 42X2	1	
19	329-053010-70	CUSHION 530X10X7MM	2	
18	329-095510-70	CUSHION 955X10X7MM	2	
17	619-300210-10	STP SCREW 3X10	22	
16	423-42SD21-01S	FILTER SUPPORT BTM	1	
15	423-42D122-01S	FILTER SUPPORT L&R	2	
14	423-42SD12-01S	FILTER SUPPORT TOP	1	
13	553-056009-40A	SHIELD GASKET 500X9X2.5MM	2	
12	553-095009-40A	SHIELD GASKET 950X9X2.5MM	2	
11	900-420103-01B	DISPLAY FILTER GLASS	1	
10	614-400408-10	STP SCREW 4X8	2	
9	277-42D101-01S	FUNCTION KNOB	1	
8		KEY PCB	1	
7	388-42D101-01	PC SHEET FOR KEY PCB	1	
6	614-260208-10	STP SCREW 2.6X8	5	
5	388-42D102-01	PC SHEET FOR REMOTE PCB	1	
4		REMOTE PCB	1	
3	269-42D101-01L	REMOTE LENS	1	
2	263-42D101-01S	POWER LEN	1	
1	200-42D131-MTK02AV	FRONT CABINET	1	

DRAWN.	TOLERENCE UNLESS OTHERWISE SPECIFIED	KAWA ELECTRONIC R & D CENTRE
CHECKED	0 MM~8 MM ±0.1	MATL.
APPRD.	8 MM~25MM ±0.15	
3rd ANGLE PROJECTION	25MM~80MM ±0.2	FINISH
	80MM~250MM ±0.3	
	250MM~ABOVE ±0.6	
	ANGULAR: ±1°	

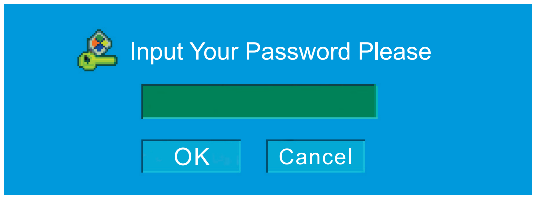
TITLE	PD42EAALUSXM1-A02		
MODEL NO.	PDP4210EA		
A2	PART NO.	DWG. NO.	
SCALE NIL	QTY.	SHEET 1	OF 1

If you forget your V-Chip Password

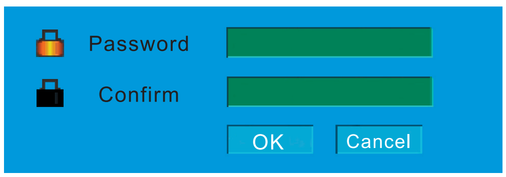
- Omnipotence V-Chip Password: 8205.

Using the “Change Password” item

1. When enter the “Parental” menu, select “Change Password”.
2. Press ▲ or ▼ button to highlight the “Change Password” item.
3. Press **Enter** button to confirm and pop up a menu.



4. Use 0~9 buttons input the omnipotence password(8205), then Press **Enter** button to enter and pop up a menu.



5. Use 0~9 buttons input your new password.
6. Press ▼ button to move to confirm blank.
7. Use 0~9 buttons input your new password again.
8. Press **Enter** button to confirm

-Suggest: Change to your familiar Password again.

Software upgrade

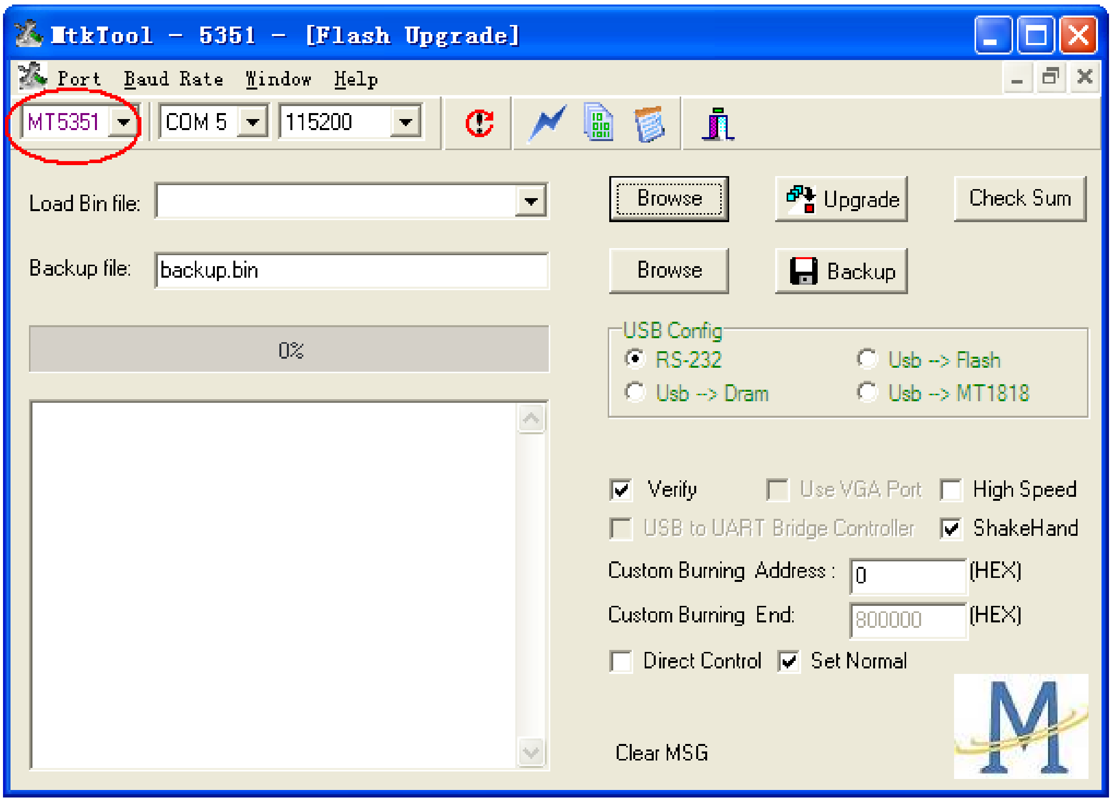
Process of update MT8205AE

Preparing :

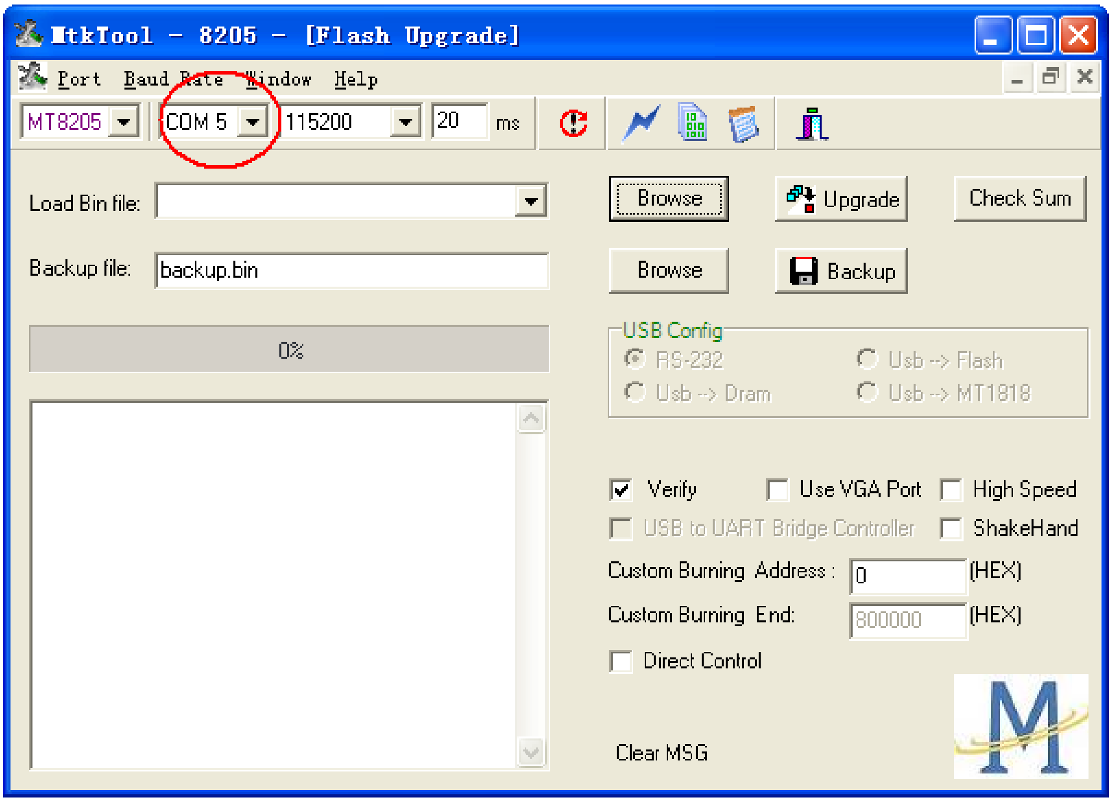
1) Connect RS232-VGA download line, One connector is connected to VGA connect port of Plasma TV while another side is connected to PC COM port.
2) Store the MtkTool into the PC .

Downloading :

3) Turn on AC power and wait TV entering standby mode, while the color of the power indicator is Red.
4) Execute MTKtool and select the chipset as MT8205. (the software of MTKtool will be sent to your side)

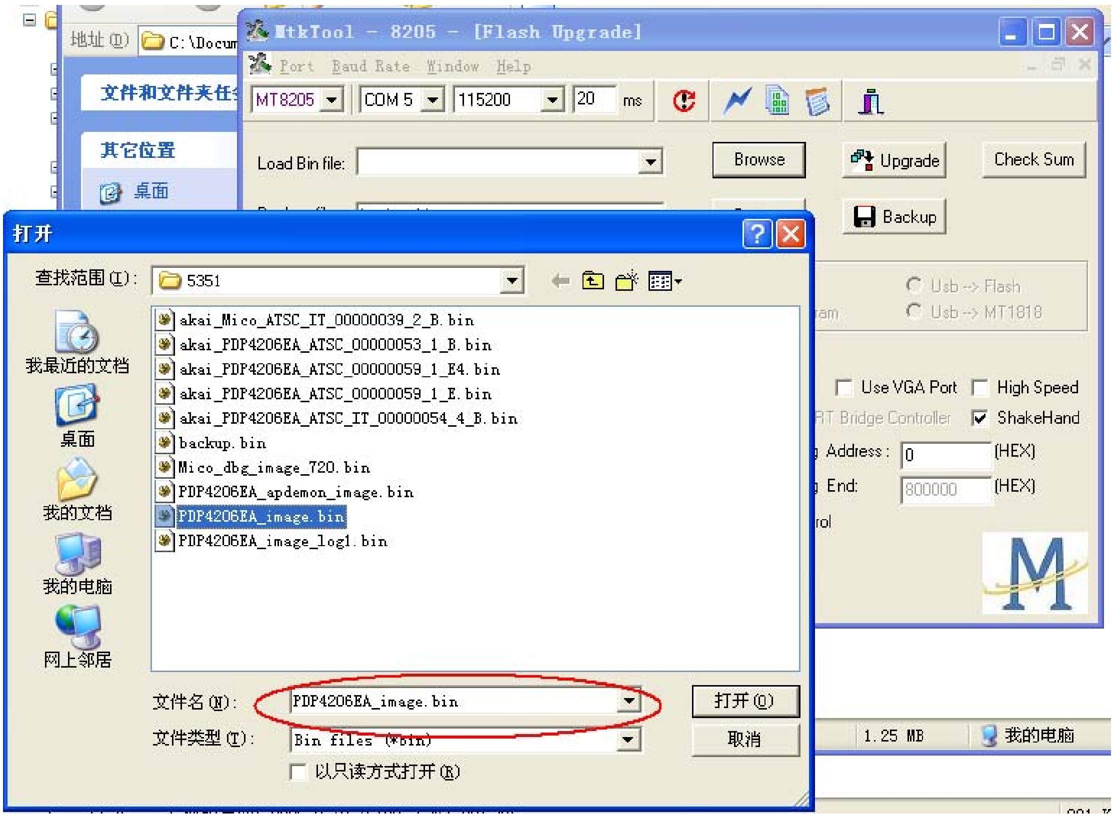


5) Select current COM port. (please try to check the COM port of your PC).

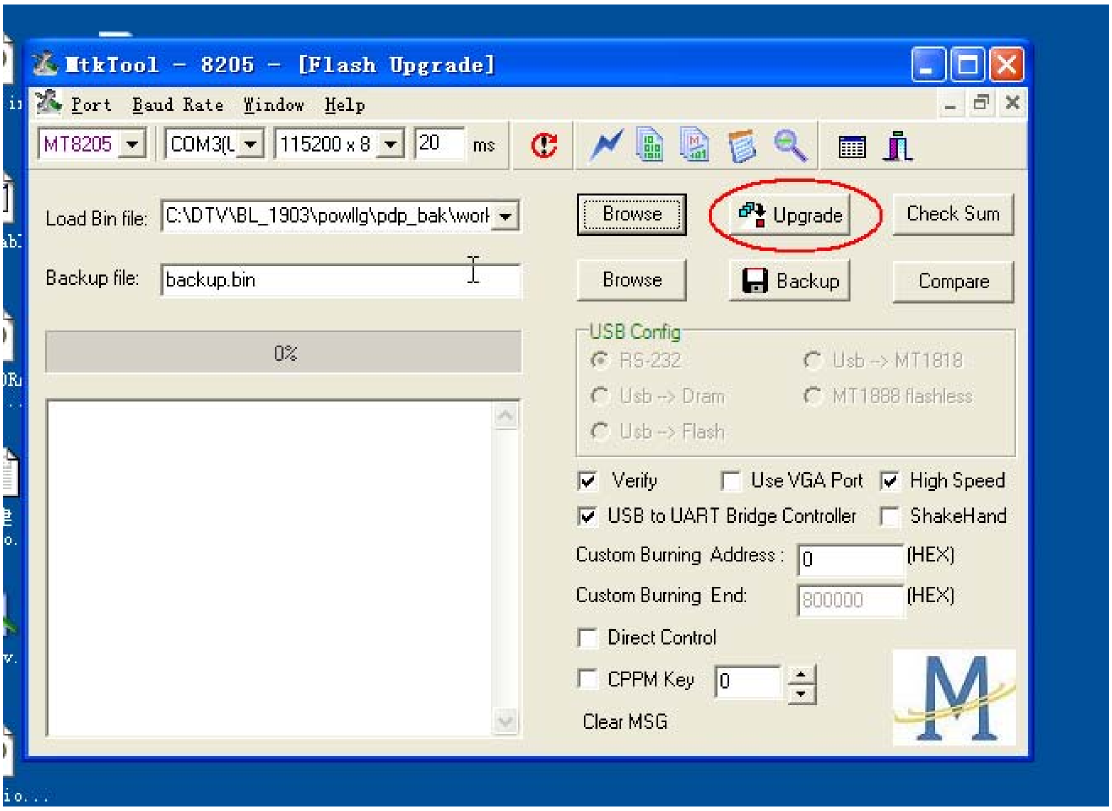


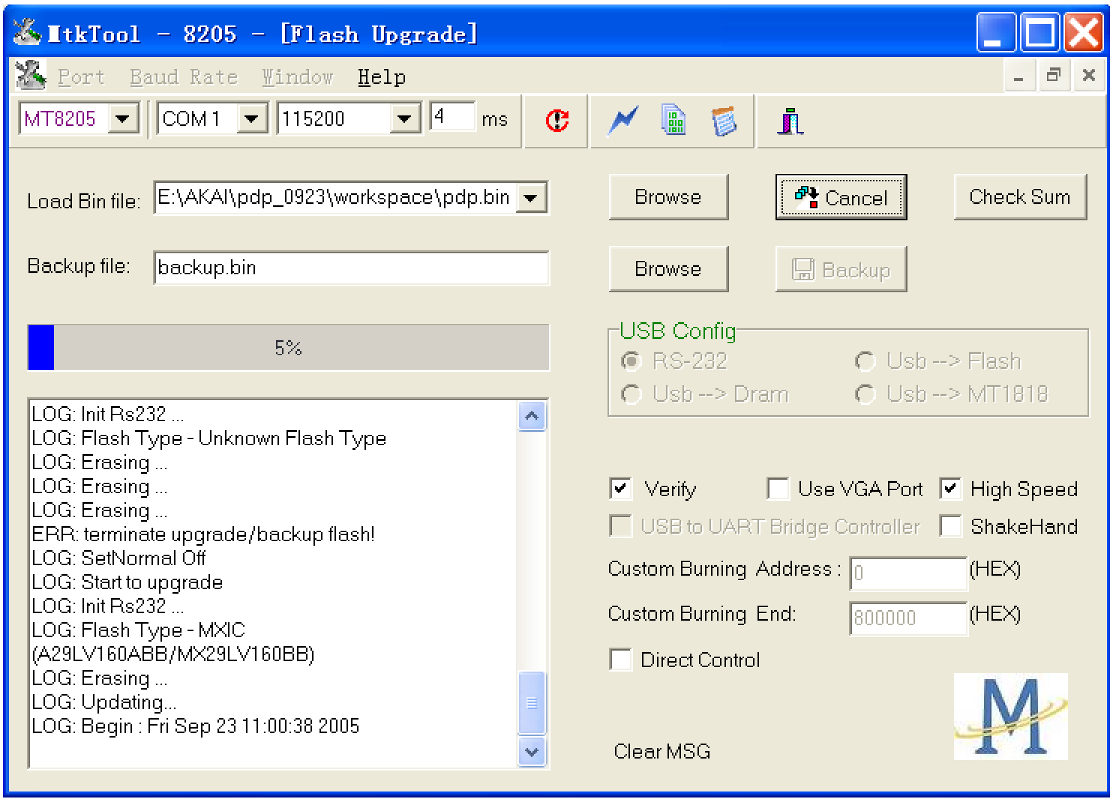
6) Choose the bit rate as 115200.

7) Select the update binary by pressing browse button. For exemple,the binary file name is PDP4210EA_VIORE_XXXXXX_XXXX_VXX.bin. (this update firmware will be sent to your side)



8) Press Upgrade button and start update process.





9) The update process is successful as the progress bar is 100%. After the update process is ok, turn off power and wait indicator light is off. Turn on power and TV can work.

Checking

It is needed to check the version of the firmware for MT8205AE which has been download into the Plasma TV .

Press Menu button of the remote control for a little long time and the OSD menu for Factory Setting is appeared on the screen .

Use the remote control and select the mode of the Factory Setting then enter the mode of the Factory Setting .

Use the remote control and select the mode of Firmware Version and then enter the mode of Firmware Version . It is easy to be found the version of the current firmware for MT8205AE is as the following : “Firmware Version : VXX ”

Process of update MT5351AG

Preparing :

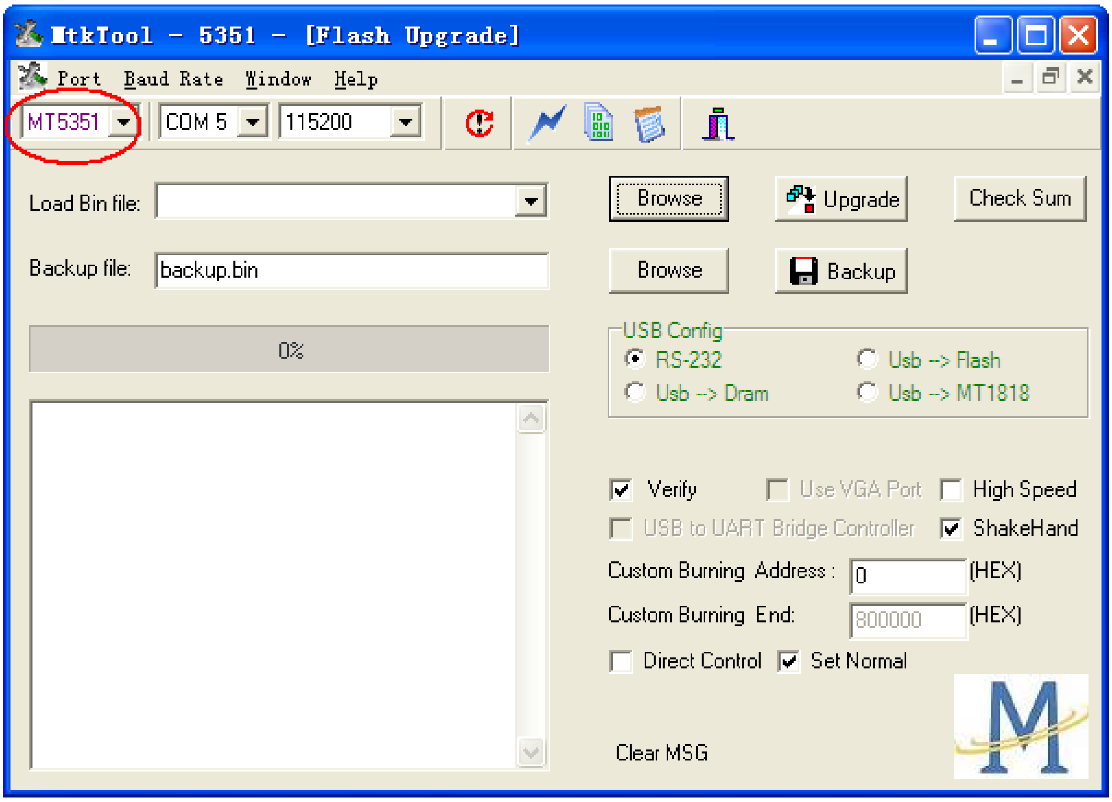
1) Connect RS232-VGA download line, One connector is connected to VGA connect port of Plasma TV while another side is connected to PC COM port.

2) Store the MtkTool into the PC

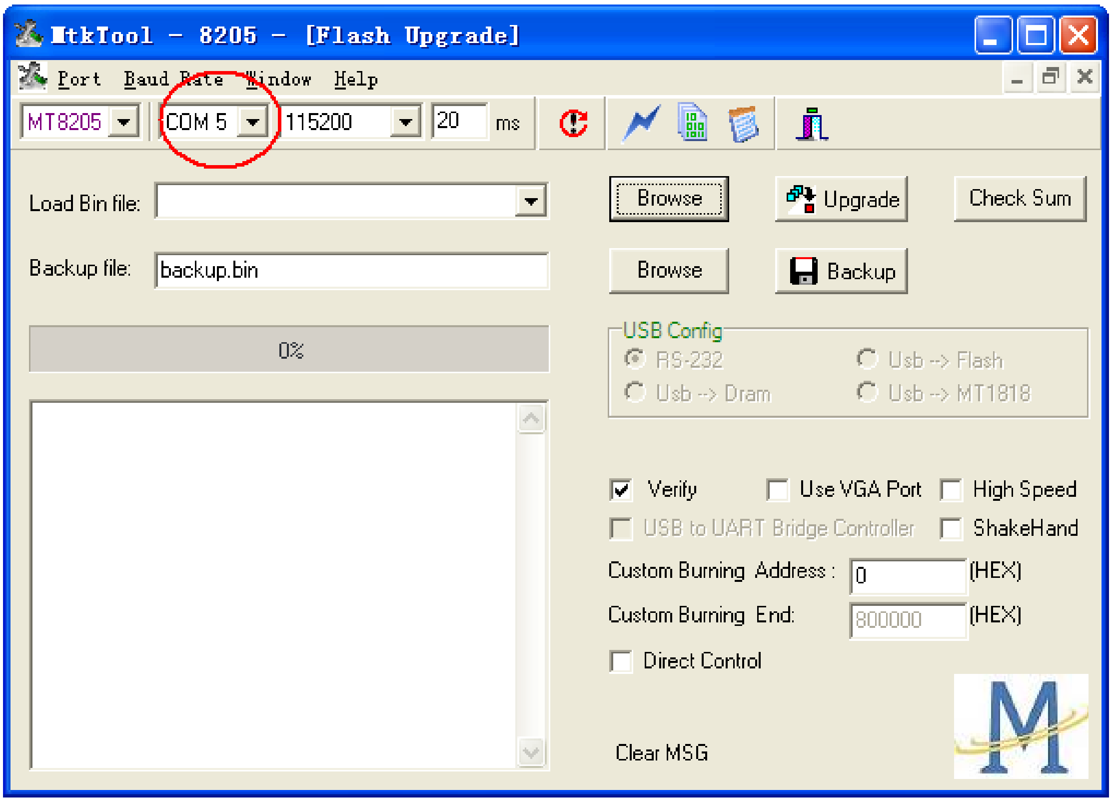
Downloading :

3) Turn on AC power switch of the Plasma TV and then press the button “standby” of the remote control . The image could be found on the screen of the Plasma TV while the color of the power indicator is green . (the mode of the Plasma TV will be standby mode if after turn on the main power switch only .)

4) Execute MTKtool and select the chipset as MT5351AG. (the software of MTKtool will be sent to your side)



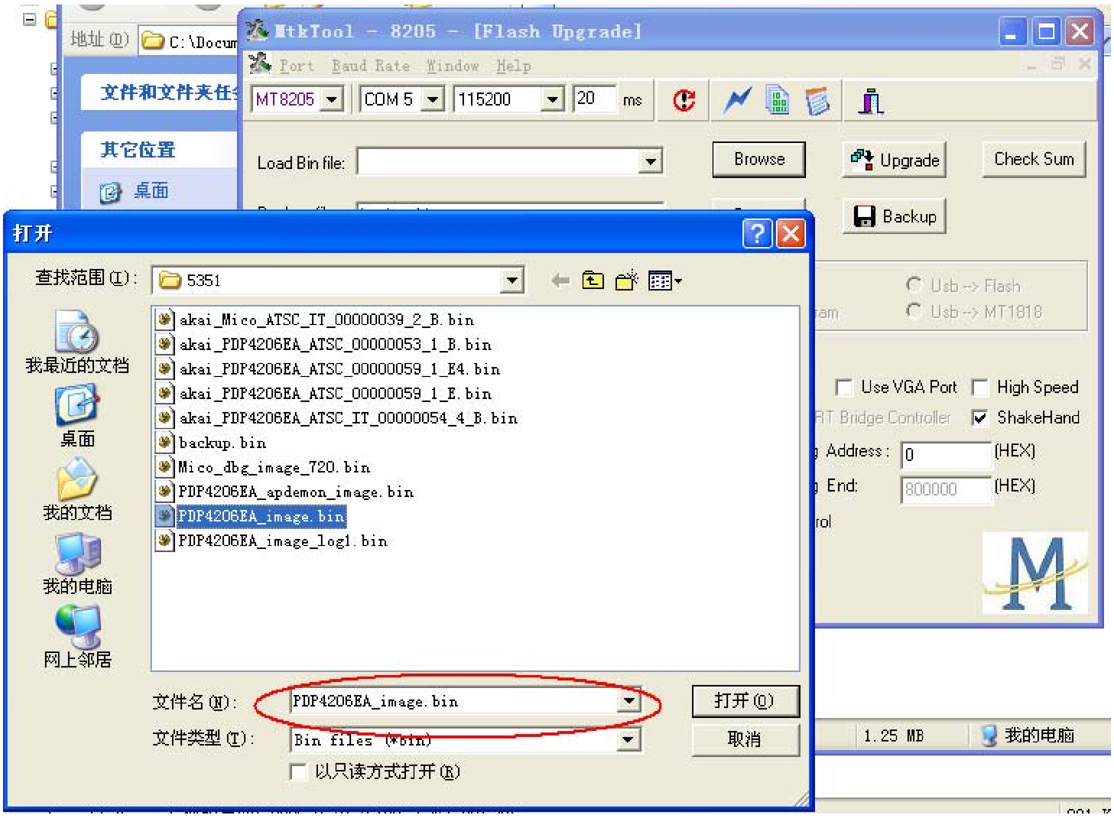
5) Select current COM port. (please try to check the COM port of your PC).



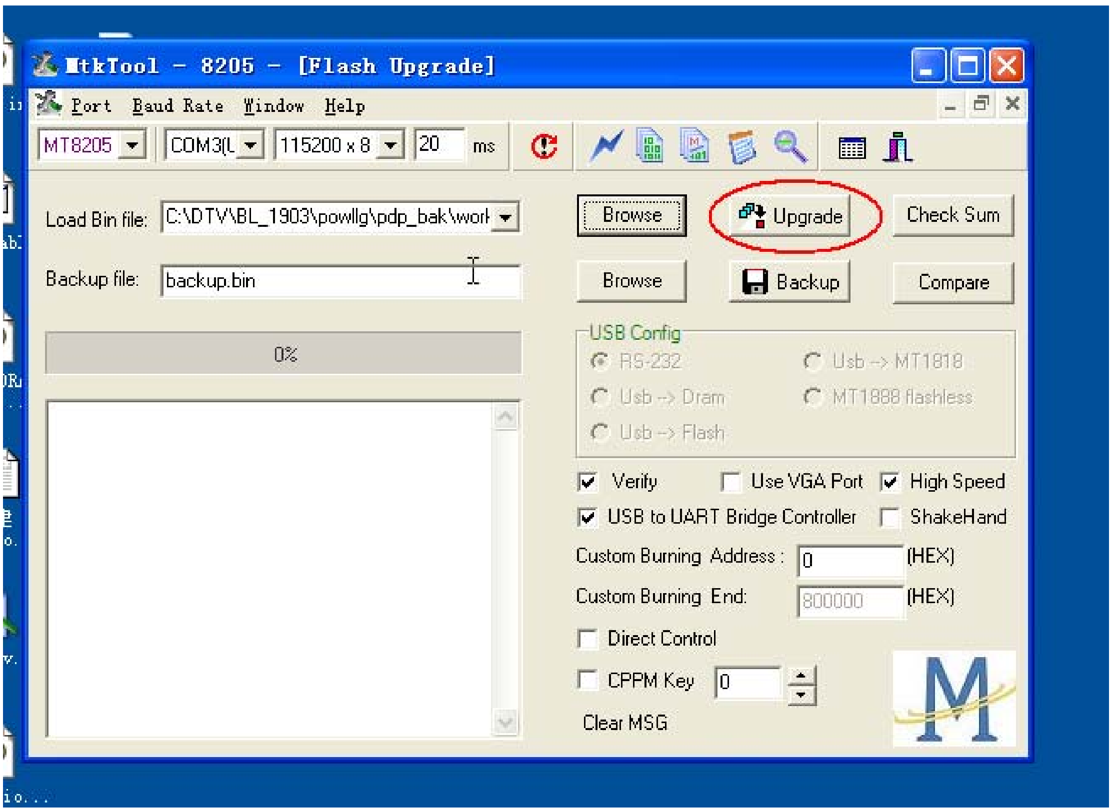
6) Choose the bit rate as 115200.

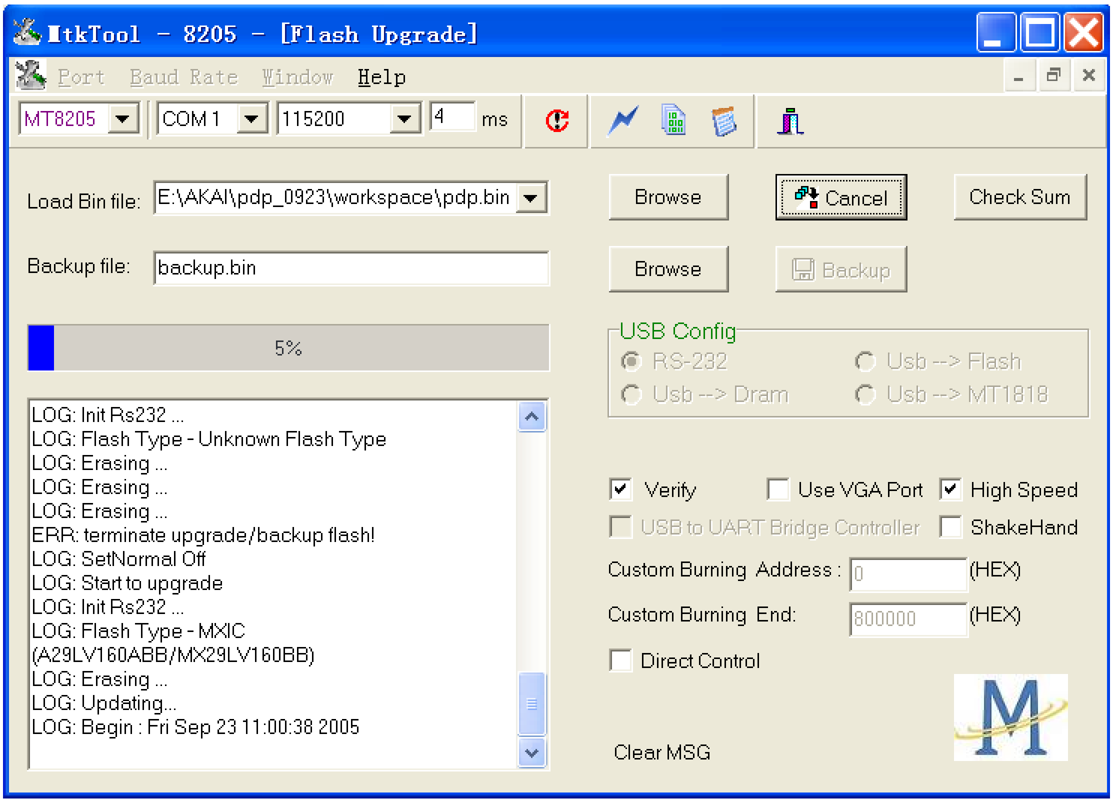
7) Select the update binary by pressing browse button. For exemple,the binary file name is

XXXX_PDP4210EA_ATSC_IT_000000XX_X_P.bin. (this update firmware will be sent to your side)



8) Press Upgrade button and start update process.





9) The update process is successful as the progress bar is 100%. After the update process is ok, turn off power and wait indicator light is off. Turn on power and TV can work.

Checking :

It is needed to check the version of the firmware for MT5351AG which has been download into the Plasma TV .

Press Menu button of the remote control and the main OSD menu is appeared on the screen .

Use the remote control and select the mode of the adjustment .

Use the remote control and select the mode of DTV

Entry the mode of DTV

Input “0000” (zero , zero , zero , zero) of the remote control while the Plsama TV is under the above condition . Then enter the mode of factory after input the digits .

It is easy to be found the version of the current firmware for MT5351AG is “XXXX_PDP4210EA_ATSC_IT_000000XX_X_P”under the mode of factory .

RS232-VGA download line

